Vol. 97, No. 7 JULY, 1950

WATER & SEWAGE WORKS

WATER SUPPLY · SEWAGE DISPOSAL · INDUSTRIAL WASTE TREATMENT

A SAMPLE OF EFFLUENT

SEE STORY IN THIS ISSUE

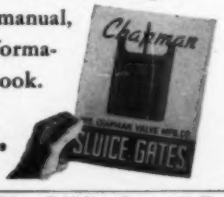
Remember!

...the *Special* Sluice Gate you need may be a **CHAPMAN** *Standard*

EASY INSTALLATION!

Better check with Chapman before you order *special sluice gates.* Frequently, you'll find the gate you require is already a Chapman standard — and available at a standard price.

You'll save, too, in the easier installation of Chapman Sluice Gates—interchangeable stems and couplings require no match-marking. What's more, Chapman Gates are obtainable with any type of operating control — manual, hydraulic cylinder or motor unit. For more complete information, send for a copy of the Chapman Sluice Gate Handbook.



The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

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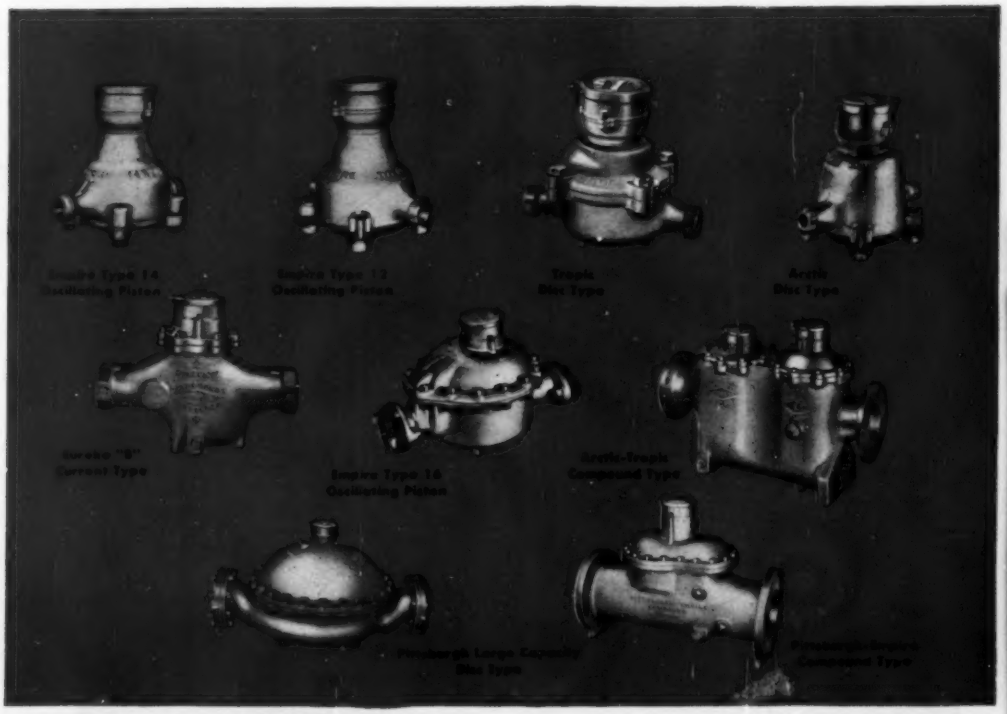
'MADE TO MEASURE'

WITH YOU IN MIND



Custom Tailored FOR YOUR WATER SYSTEM

To put an end to water waste—to increase revenue—to keep down meter maintenance costs you need the *right* type of meter on every job. Custom fitting the proper meter to the setting is an important part of Rockwell service. Since we alone make all types of meters our recommendations can be made without prejudice and in your best interests. For this type of sound advice or for help with any measurement problem you may have, write the nearest Rockwell District Office.

Pittsburgh Equitable Meter Division

ROCKWELL MANUFACTURING COMPANY

Pittsburgh 8, Pa.

Atlanta Boston Chicago Columbus Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

PITTSBURGH WATER METERS

Sanitation HTH is your useful hypochlorination friend that never lets you down. Dry, free-flowing, easy to handle and store, this 70% chlorine carrier will meet your everyday sanitizing problems – regular chlorination of water supplies, reservoirs, tanks, new mains, filters.

When foul weather strikes and mains break, floods flash, or other emergencies arise, HTH provides the solution for large-scale, on-the-spot chlorination—*if you have it on hand!*

Don't risk being caught short. Replenish your HTH stock *now* and rely on this faithful friend–not only for today's routine chlorination jobs but for tomorrow's big ones as well. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Sanitation HTH is available in cases of nine handy 5-lb. cans or 100-lb. drums.

Mathieson
CHEMICALS

Sanitation HTH . . . PH-Plus (fused alkali) . . . Liquid Chlorine . . . Chlorine Dioxide . . . Anhydrous Ammonia

8134

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

WATER & SEWAGE WORKS

WATER SUPPLY—SEWAGE DISPOSAL—INDUSTRIAL WASTE TREATMENT

E. S. GILLETTE, Publisher

L. H. ENSLOW, Editor

COMING!

A Complete Sewer System of Asbestos-Cement Pipe

As far as we know Macclenny, Fla., is the first to have a sewer system constructed wholly of asbestos-cement pipe, including house connections also. This article, based on experience, observed facts and results, presents the several advantages predicted and realized in the construction of sewers with the long length asbestos-cement pipes laid with semi-flexible bottle-tight joints. The reader will be especially interested in the economics of the project which involves savings in labor and construction costs that offset the higher cost of the pipe and joints. The article comes from the consulting engineers who selected asbestos-cement pipe for the project and designed and supervised installation of the sewer system and treatment plant.—

A. E. WILLIAMSON and JOE WILLIAMSON,
Russell and Axton, Engrs., Daytona Beach, Fla.

The Statistical Evaluation of Analytical Data

Has not heretofore been applied except sparsely to stream study data or plant operation results in water and sewage treatment. The first of a series of articles presenting this new and highly useful "tool" in the proper and most accurate interpretation of analytical results and operating or test data in general appeared in our May, 1950, issue. Others in the series will follow as rapidly as permissible. The author is a pioneer in this statistical approach in evaluating sanitary engineering data.—

PROF. CLARENCE J. VELZ,
Univ. of Michigan, Ann Arbor, Mich.

Improved Sulphate Determination

The procedure in "Standard Methods" for the determination of the sulphate ion by the Benzidine Hydrochloride Method has two serious limitations. These have been overcome in a modified procedure which is applicable over a wider and more useful range while also being more accurate. The modified method is presented by—

R. S. INGOLS and J. W. McCONNELL,
Georgia Inst. of Technology, Atlanta, Ga.

Improving Water Quality by Cleaning Reservoirs

Is a story of an impressive improvement in raw water quality which has resulted from muck removal from storage reservoir bottoms in shallow areas, and the drainage of swamps bordering the feeder streams. The results have more than justified the trouble and expense involved. Methods employed are related by—

M. S. WELLINGTON,
San. Engr., New Haven (Conn.) Water Co.

Sewage Chlorination at So. Yonkers, N.Y.

Is an application of the conventional influent and effluent chlorination for odor control and disinfection. The article describes the modernization and enlargement of the plant, including the use of single unit tank cars of liquid chlorine which are housed on a siding within the building. The chlorine is fed direct from the single unit tank cars. The story of the increased chlorine requirement and how the problem was met is told by—

ARTHUR E. NICHOLS, Supv. Engr.,
So. Yonkers (N.Y.) Sewage Works.

Sewer Maintenance & Operation

Is the subject of a series of short pithy articles by an operator who is an advocate of "Special Tools for Special Work," as a safety and time saving economy measure. He is—

REUBEN F. BROWN, Supt.
Sewer Maint. & Operations, Los Angeles.

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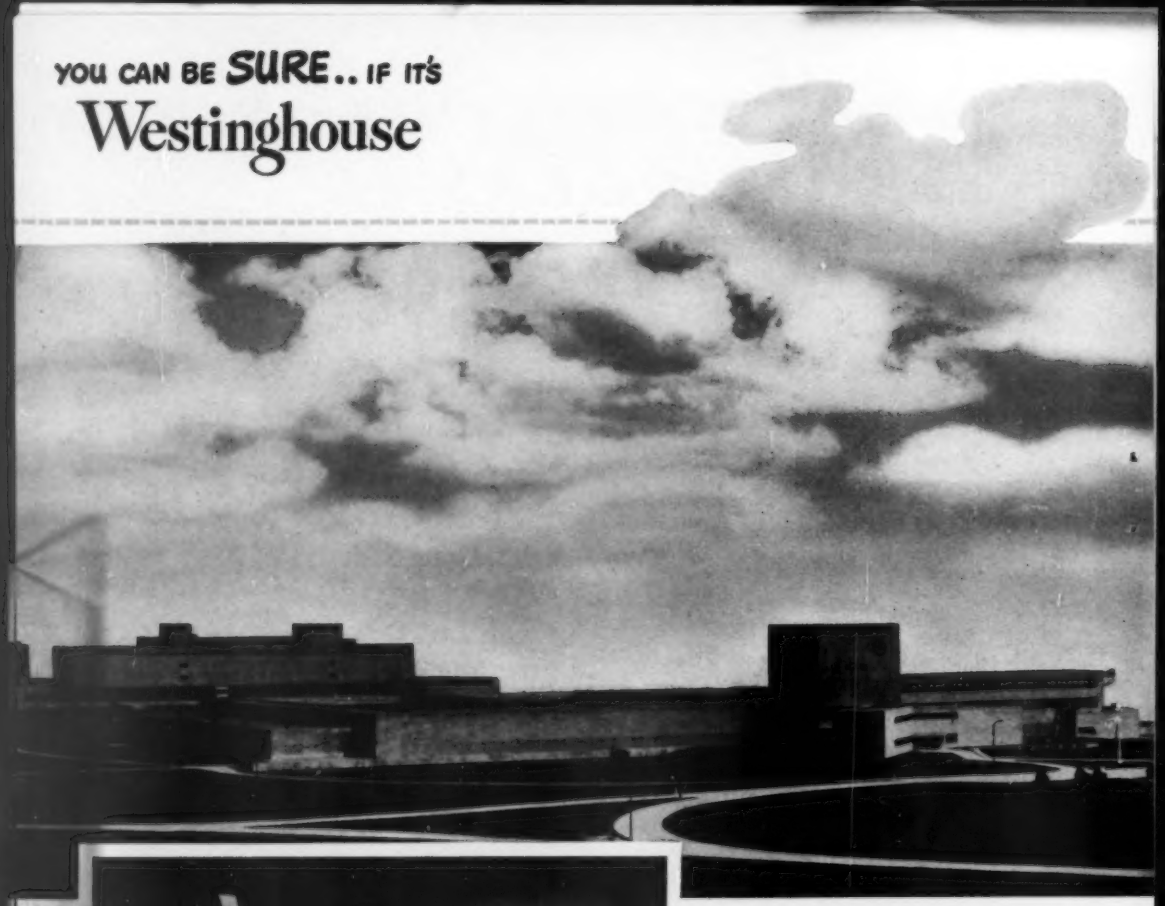
YOU CAN BE **SURE**.. IF IT'S

Westinghouse



The Chicago South District Filtration Plant shown here is the largest in the world, serving more than a million and a half people. The plant has operated at an hourly peak of 546 mgd with only 70 of the 80 filters in service.

This mezzanine switchgear room in the lower left pumping station is an example of the way Westinghouse designs and manufactures electrical equipment for a co-ordinated, efficient system. (Right) High-voltage switchgear gives necessary protection on incoming lines, as well as feeders, and supplies power to large pump motors and station transformers. (Left) Low-voltage switchgear controls station auxiliaries such as priming pumps, crane motor feeder and valves. (Rear center) Network protectors and 120/208-volt distribution for building lighting and miscellaneous power. (Front center) Control desk with mimic bus, indicating instruments and circuit breaker switches centralizes control of plant equipment.

Westinghouse

EQUIPMENT
FOR PUBLIC WORKS

Unit Responsibility

ASSURES WATER WORKS EFFICIENCY

For any water works, large or small, higher operating efficiency depends in part on your electrical manufacturer.

He should provide every type of electrical equipment . . . give you a co-ordinated engineering application . . . based on practical experience in water works electrification.

These elements add up to unit responsibility and mean reduced operating costs for your plant. You get them all from Westinghouse:

Westinghouse makes a complete line of electrical equipment for water works. This includes "Unitized" metal-clad switchgear; packaged power centers, power transformers and unit substations; control and control centers; motors and gearmotors, as well as other electrical apparatus and supplies.

Westinghouse Consulting and Application Engineers are available to work with you. They will help you select and apply the right equipment to give you a co-ordinated, efficient electrical system.

Westinghouse brings you a background of long experience in applying electrical equipment to water works. The Chicago South District Filtration Plant, shown here, is but one more in a large list of outstanding installations where Westinghouse unit responsibility has been *proved* on the job.

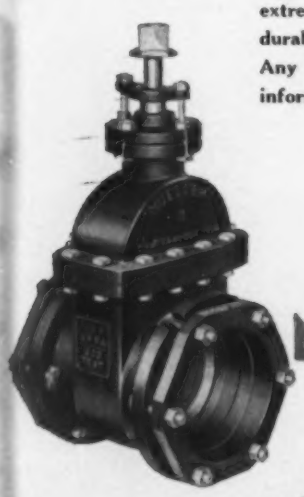
For help on your water works electrification problems, call your nearest Westinghouse District Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94818

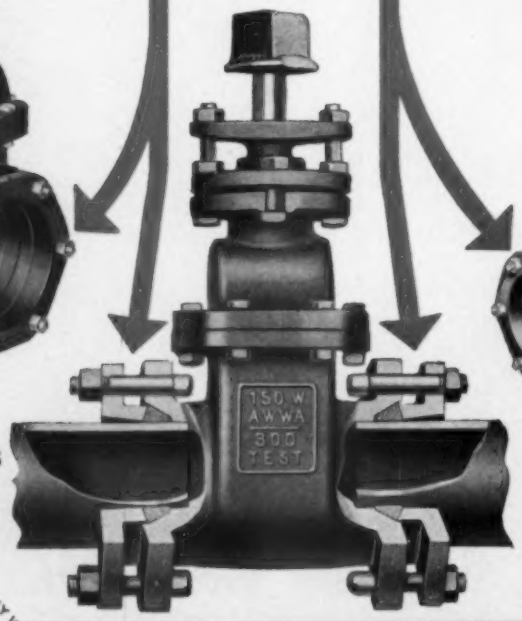
This control center on the third floor of the Chemical Building groups into one unit all the combination linestarters and motor control for fan motors, agitator drives and other auxiliary equipment in this plant area.

These two 300-kva, 3-phase, 60-cycle, 2300/120-208-volt, liquid-filled distribution transformers are located in the west pump room and supply power for the building lights and equipment in the Filtration Plant.

THE STANDARDIZED MECHANICAL JOINT ENDS ON MUELLER GATE VALVES and HYDRANTS

Another addition to the conventional means of connecting Gate Valves and Hydrants, is the MUELLER STANDARDIZED MECHANICAL JOINT. It has been designed and manufactured to insure a permanent leak-proof joint when installed on any standard pipe. This type of installation is often preferred because it requires no pouring of lead or caulking- - just a ratchet wrench is used to tighten the bolts and the work may be done even in a flooded trench and in any kind of weather... The extreme ruggedness of the joint matches the inherent durability of the Valves and Hydrants themselves. Any MUELLER Representative can give you full information, or if you prefer, write us direct.





MUELLER AWWA GATE VALVES Supplied with the Mechanical Joint End. Sizes 4" to 12"

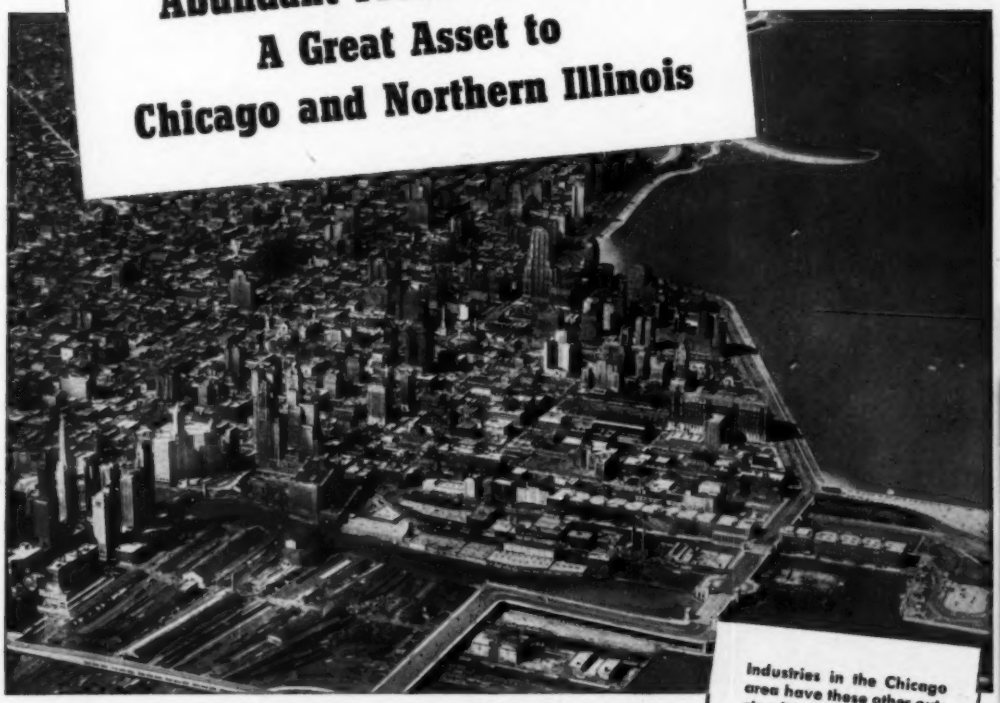
MUELLER FIRE HYDRANTS Supplied with the Mechanical Joint End in all standard sizes.

DEPENDABLE SINCE 1857 — FULLY WARRANTED — OUR 93rd YEAR

MUELLER CO.

FACTORY: *Chattanooga, Tenn.* MAIN OFFICE AND FACTORY: *Decatur, Ill.*
OTHER FACTORIES: *Los Angeles, Cal.* * * * * *Sarnia, Ont. Canada*

Abundant Fresh Water . . . A Great Asset to Chicago and Northern Illinois



An unfailing supply of fresh water, so essential to numerous industrial operations, is one of the chief assets of the Chicago area. And in addition to abundant water, industry in the Chicago area has the added advantage of the lowest cost water in the country.

Lake Michigan, at Chicago's front door, provides an unlimited source of water, immediately available for all uses. Continuously expanding pumping facilities, capable of furnishing approximately 2 billion gallons per day, assure uninterrupted water service to the 3,725,000 Chicagoans who are now utilizing Lake Michigan water. These users, and the users in nearby cities and villages of the Chicago area, have the security of knowing that Lake Michigan will continue to meet the growing demands of expanded industry and greater population.

In order to assure the purity of the water supplied through the Chicago water system, a vast filtration project is under way. The first unit is now completed. The complete project, as planned, will provide filtered water for the entire Chicago metropolitan area.

Industries in the Chicago area have these other outstanding advantages:

Railroad Center of the United States • World Airport • Inland Waterways • Geographical Center of U. S. Population • Great Financial Center • The "Great Central Market" • Food Producing and Processing Center • Leader in Iron and Steel Manufacturing • Good Labor Relations Record • More than 2,500,000 Kilowatts of Power • Tremendous Coal Reserves • Good Government • Good Living • Good Services for Tax Dollars.

You are invited to write for information concerning Chicago's advantages for your business. We will gladly furnish you a confidential survey of conditions here, as they apply to your specific problem. There is no obligation, of course.

TERRITORIAL INFORMATION DEPARTMENT

Marquette Building—140 South Dearborn Street, Chicago 3, Illinois

COMMONWEALTH EDISON COMPANY • PUBLIC SERVICE COMPANY OF NORTHERN ILLINOIS
WESTERN UNITED GAS AND ELECTRIC COMPANY • ILLINOIS NORTHERN UTILITIES COMPANY

Without beam strength—or, for that matter—without all of the strength factors listed opposite—no pipe laid 100 years ago in *city streets* would be in service today. But, in spite of the evolution of traffic from horse-drawn vehicles to heavy trucks and buses—and today's vast complexity of subway and underground utility services—cast iron gas and water mains, laid over a century ago, are serving in the streets of more than 30 cities in the United States and Canada.

Such service records prove that cast iron pipe combines all the strength factors of long life with ample margins of safety. No pipe that is provably deficient in any of these strength factors should ever be laid in city streets. Cast Iron Pipe Research Association, Thos. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3.

CAST IRON PIPE

Strength factors of Long Life !

No pipe that is provably deficient in any of these strength factors should ever be laid in city streets

BEAM STRENGTH

When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

CRUSHING STRENGTH

The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

SHOCK STRENGTH

The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times *on the same spot* from progressively increased heights of 6 inches.

BURSTING STRENGTH

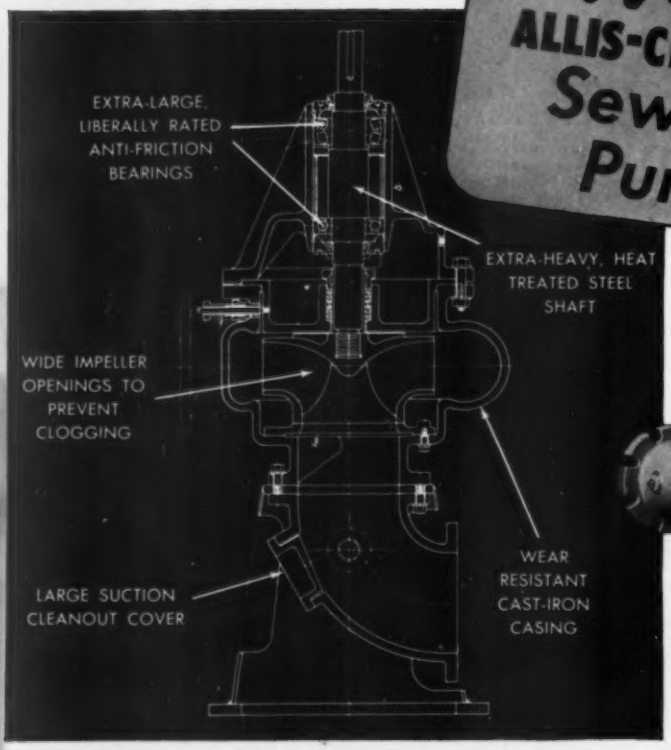
In full length bursting tests standard 6-inch cast iron pipe withstands more than 2500 lbs. per square inch internal hydrostatic pressure, which proves ample ability to resist water-hammer or unusual working pressures.

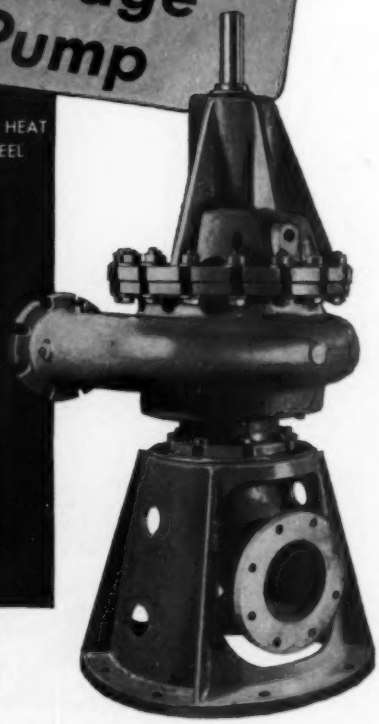
CAST IRON

SERVES FOR CENTURIES

ANNOUNCING..

New ALLIS-CHALMERS Sewage Pump


EXTRA-LARGE, LIBERALLY RATED ANTI-FRICTION BEARINGS
EXTRA-HEAVY, HEAT TREATED STEEL SHAFT
WIDE IMPELLER OPENINGS TO PREVENT CLOGGING
WEAR RESISTANT CAST-IRON CASING
LARGE SUCTION CLEANOUT COVER



EXTRA-HEAVY CONSTRUCTION OF NEW DESIGN GIVES LONG PUMP WEAR, LOW MAINTENANCE

A SURVEY among sewage works engineers showed what features they wanted most in this new sewage pump: (1) Ability to "take it" under tough service, (2) Continuous operating efficiency, (3) Easy maintenance. And here's how A-C built those features right into this new pump.

There's an extra heavy shaft — heavier than in ordinary sewage pumps. To prevent clogging, there's a generous liquid passage with rounded-off impeller inlets. For easy maintenance, the husky cast-iron casing is split radially so the complete rotating element can be removed. Simply drop out the universal coupling and loosen main bolts... takes only a few minutes.

Standard sizes to 10,000 gpm. Can be built larger. For complete details, write for Bulletin 08S7504.

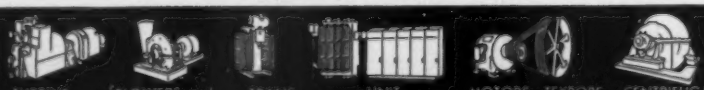
ALLIS-CHALMERS, 1192A SO. 70 ST. MILWAUKEE, WIS.

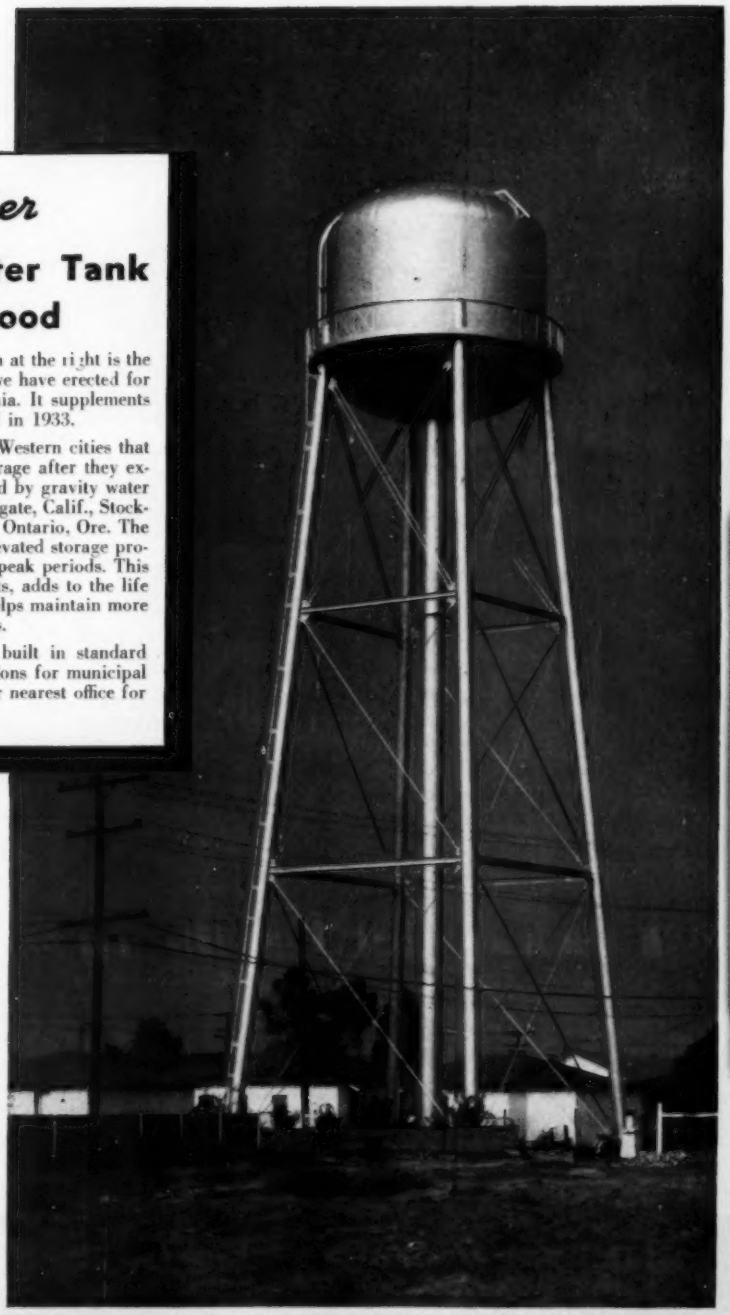
ALLIS-CHALMERS

Texrope is an Allis-Chalmers trademark.

A-3100

World's Widest Range of Public Works Equipment





Another

Elevated Water Tank for Lynwood

The 100,000-gal. tank shown at the right is the *second* Horton elevated tank we have erected for the city of Lynwood, California. It supplements a previous installation erected in 1933.

Lynwood is one of several Western cities that have added more elevated storage after they experienced the benefits provided by gravity water pressure. Others include Southgate, Calif., Stockton, Calif., Visalia, Calif., and Ontario, Ore. The trend is continuing because elevated storage provides for pumping during off-peak periods. This generally lowers pumping costs, adds to the life of pumping equipment, and helps maintain more uniform distribution pressures.

Horton elevated tanks are built in standard capacities up to 3,000,000 gallons for municipal distribution systems. Write our nearest office for estimating figures.

ENGINEERING DATA ON LYNWOOD WATER SYSTEM

Reasonable Source of Water ..... Wells

Area Served ..... 3.40 sq. mi.

Customers Served 7900

Average Daily Consumption .... 4.1 MG

Length of Distribution Mains ... 88 miles

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2181 Healey Building
Birmingham 1.....1586 North Fifteth Street
Boston 10.....1040—201 Devonshire Street
Chicago 4.....2198 McCormick Building
Cleveland 15.....2262 Guildhall Building
Detroit 26.....1551 Lafayette Building
Houston 2.....2115 National Standard Building
Havana.....402 Abreu Building
Los Angeles 17.....1555 General Petroleum Building
New York 6.....3390—165 Broadway Building
Philadelphia 3.....1644—1700 Walnut Street Building
Salt Lake City 4.....550 West 17th South Street
San Francisco 4.....1583—200 Bush Street
Seattle 1.....1350 Henry Building
Tulsa 3.....1646 Hunt Building

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

In Canada—Horton Steel Works, Limited, Fort Erie, Ont.

Now! POMONA

brings you

5 Big New Advantages

The Fairbanks-Morse Pomona Vertical Deepwell Turbine Pump always did give you more for your pump dollar. NOW, it's even better. New water-lubricated, external sleeve bearing assembly brings you these five important advantages:

1. Longer-life wearing surface
2. Positive, continuous flushing action
3. No liquid entry between shaft and sleeve bearing
4. Minimum friction and shaft bearing losses
5. Easy, simple field replacement of worn sleeves

This new advance in turbine pump bearing design assures maximum life of the bearing assembly without any sacrifice in line shaft streamlining and bowl efficiencies. The full-floating, spiral groove, natural rubber bearing assures positive, efficient water lubrication. The grooves provide continuous flow from end to end of the bearing and eliminate any possibility of sand particles traveling across the full face of the bearing.

Add them all up and you'll see why you get maximum efficiency . . . longest life . . . lowest maintenance costs with Pomona. Your branch pump engineer or Fairbanks-Morse Pomona Dealer will be happy to give you the full details. Or, if you prefer, write direct to Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES
HOME WATER SERVICE AND HEATING EQUIPMENT • RAIL CARS • FARM MACHINERY

New, spiral groove, natural rubber bearing.

Can you brag about the palatability of your water?

YOU can if you stock and use Aqua Nuchar Activated Carbon. In fact, over 1200 communities have used Aqua Nuchar to insure delivery of palatable water 365 days a year . . . at an average cost of less than two cents per capita per year.

Be prepared for any taste or odor eventuality by stocking Aqua Nuchar Activated Carbon and by running periodic Threshold Odor Tests. Our Technical Service Department will be glad to run a Threshold Odor Demonstration in your community without obligation.

OTHER PRODUCTS

Snow Top Precipitated Calcium Carbonate • Nuchar Activated Carbons • Liqro Crude Tall Oil
Indusoil Distilled Tall Oil • Tallene Tall Oil Pitch • Tallex Abietic Acid • Sulfate Wood Turpentine
Alpha Pinene • Beta Pinene • Polycel Cellulose Fibers • Indulin (lignin)

INSURES PALATABLE NUCHAR DRINKING WATER

industrial CHEMICAL SALES
division west virginia pulp and paper company

NEW YORK CENTRAL BLDG.
230 PARK AVENUE
NEW YORK 17, N. Y.

PURE OIL BLDG.
35 E. WACKER DRIVE
CHICAGO 1, ILLINOIS

LINCOLN-LIBERTY BUILDING
BROAD AND CHESTNUT STS.
PHILADELPHIA 7, PA.

LEADER BLDG.
526 SUPERIOR AVE., N.W.
CLEVELAND 14, OHIO

Less Infiltration

TRANSITE* SEWER PIPE offers two basic safeguards that minimize infiltration in sewer lines: *tighter* joints and *fewer* joints.

Transite's special sleeve-type joints make up tight and stay tight in service.
Its long 13-foot lengths reduce the number of joints in the system.

These safeguards cut down the volume usually allowed for infiltration, reducing sewage load on the treatment plant and conserving plant capacity for future needs. Where new treatment facilities are planned, this reduced infiltration may permit consideration of a smaller plant with resulting economies.

Other Transite Economies—Transite's long lengths help maintain uniform grades; fewer joints reduce turbulence in the line. These advantages, added to Transite's unusually smooth interior, mean better flow qualities (Kutter's n=.010). This often permits designing the system with flatter grades and shallower trenches. Or, as an alternate economy, pipe of smaller diameter may be specified.

Transite Sewer Pipe is made of asbestos, cement and silica by a special manufacturing process that employs steam curing to develop greater corrosion resistance and strength. It is available in four strength classes in sizes to 36", permitting selection of the pipe best suited to trench conditions, and frequently eliminating the need for concrete cradles.

For further details, write Johns-Manville, Box 290, New York 16, N. Y.

*Transite is a Johns-Manville registered trade mark

.....Johns-Manville

TRANSITE SEWER PIPE...

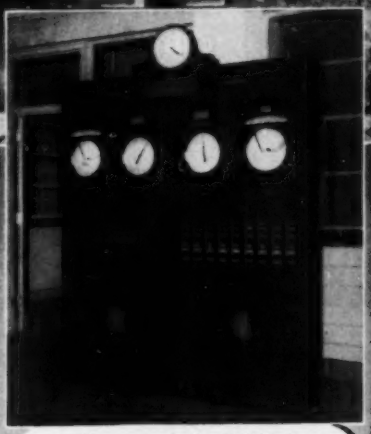
MARTINSVILLE, VA.

Water Works

(COMPLETED IN 1948)

WILEY and WILSON
Consulting Engineers
Lynchburg, Va.

RICHARD L. MAURY
Public Works Director
Martinsville, Va.

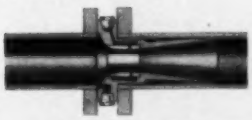


Designed by Wiley and Wilson, Consulting Engineers, this new plant features remotely supervised control of a raw water pumping station.

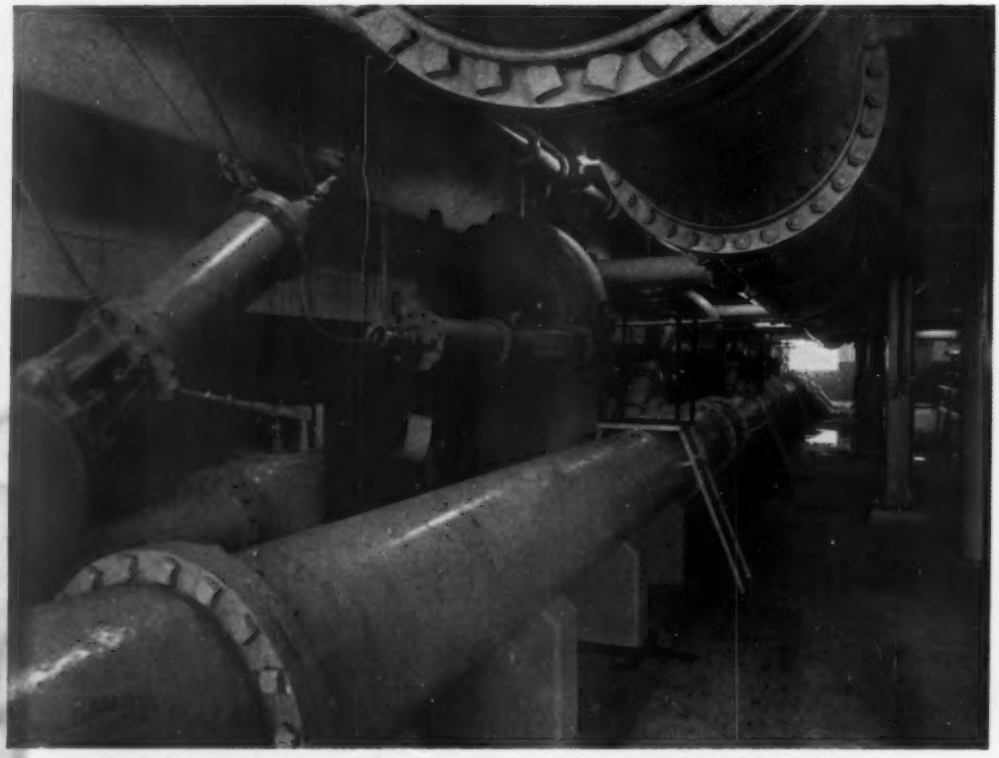
The Martinsville Water Works relies on metering and Chronoflo control equipment furnished by Builders-Providence, Inc. and installed by Roberts Filter Mfg. Co. of Darby, Pa. The raw water pumps, located at Beaver Creek and Jones Creek Station several miles from the filter plant, are metered and remotely controlled from a main panel in the Filter Building. The equipment features continuous indication of pump operation, flow, and pressure over a single pair of leased commercial telephone lines. Also included in the plant are Chronoflo reservoir water level gauges, clear well depth gauge, Chronoflo high service pump discharge register, and local control of wash water and high service pumps. For Bulletins describing Builders water works equipment, address Builders-Providence, Inc. (Division of Builders Iron Foundry), Providence 1, R. I.

Builders equipment furnished for the Martinsville Water Works:

- 20" Model VT54 Venturi Tube
- Chronoflo Transmitters and Remote Totalizer-Indicator-Recorders
- Chronoflo Pressure Transmitter and Indicator for Reservoir Level
- Indicating Depth Gauge
- 20" Model NZIF Insert Nozzle
- Supervisory Control System



BUILDERS PROVIDENCE
Instruments



MONO-CAST Pipe for Every Service Condition

"Mono-Cast" is the trade name for Acipco pipe cast centrifugally in sand-lined molds. Uniform metal section, high physical strength, endurance, and freedom from inclusions are salient properties which have established the name "Mono-Cast" as synonymous with "highest quality cast iron pipe." It can be supplied with joints for conveying water, gas, oil, gasoline, sewage, salt brine, ashes—and in fact, just about everything that a pipe line can conceivably convey.

Being cast iron, Mono-Cast Pipe enjoys an enviable reputation. Cast iron pipe has had over three hundred years of service abroad and more than one hundred years of service in the United States. It is satisfactorily serving in locations where especially severe external and internal corrosion conditions exist. Mono-Cast Pipe is designed to give super-service; and its wide acceptance and splendid performance bespeak its excellence and the confidence and esteem in which it is held by those who are using it.

Since the beginning of our Company, forty-five years ago, Acipco has constantly worked hand-in-hand with engineers, contractors and superintendents in solving piping problems in their respective fields. Refer your next piping job to Acipco, and utilize the extensive manufacturing facilities of the largest individual cast iron pipe foundry in America.

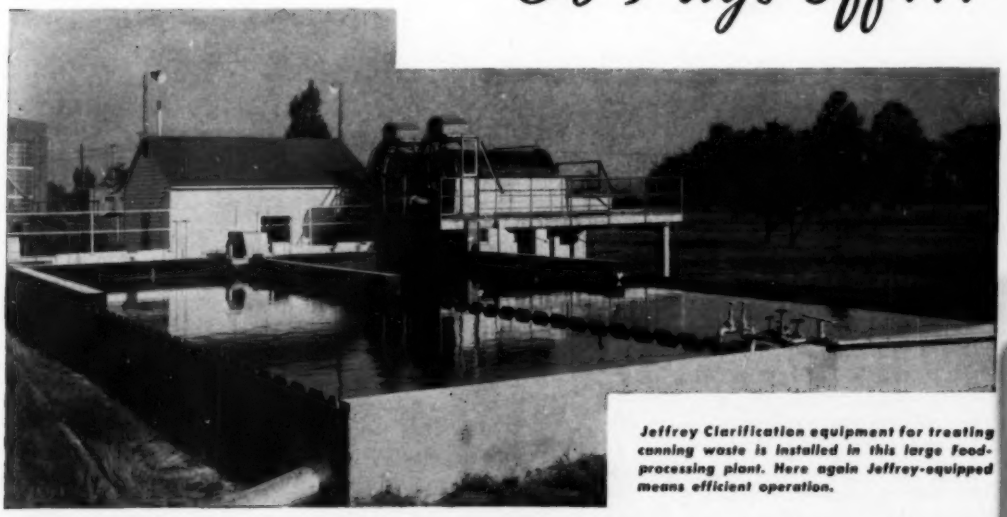
AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM 2, ALABAMA

Dallas	Houston	El Paso	Pittsburgh	Kansas City	New York City
Chicago	Minneapolis	Cleveland	Los Angeles	San Francisco	Seattle

TREAT INDUSTRIAL WASTE RIGHT

It Pays Off...



Jeffrey Clarification equipment for treating canning waste is installed in this large Food-processing plant. Here again Jeffrey-equipped means efficient operation.

Industrial Waste is the Peck's Bad Boy in nearly every plant . . always in bad with the neighbors as well as State Pollution Control Commissions.

Clarification of industrial waste need not be such a bad problem. Jeffrey has the facilities for proper and efficient waste treatment . . can help you keep the nation's waters clean. For meeting exacting specifications we can furnish Collector mechanisms for Grit Chambers and Settling Basins, Screens, grease and oil Skimmers, Flocculation equipment, etc., backed by years of experience in designing and building the best in Sewage and Water treatment equipment.

We will be glad to send you some of the names of outstanding plants in which Jeffrey equipment is doing a real job on the purification of sewage and concentrated organic wastes . . and paying off. May we hear from you?

Bar and Disc-type Screens
Sludge Collectors
Sludge Elevators
Grit Washers and Collectors

FLOCTROLS (controlled flocculation)
Equipment for Biofiltration plants
Transmission Machinery
Scum Removers
Garbage Grinders

Chemical Feeders
Screenings Grinders
Belt and Spiral Conveyors
Chains and Sprockets

THE JEFFREY MANUFACTURING COMPANY

Established 1877

996 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2
Birmingham 3
Boston 16
Buffalo 2
Chicago 1
Cincinnati 2
Cleveland 13
Denver 2
Detroit 13
Harlan
Houston 2
Huntington 19
Jacksonville 2
Milwaukee 2
New York 7
Philadelphia 3
Pittsburgh 22
St. Louis 1
Salt Lake City 1
Scranton 3

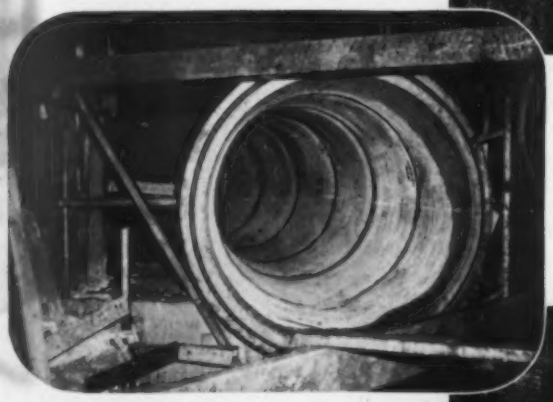
Jeffrey Mfg. Co., Ltd., Head Office & Works: Montreal

CONCRETE PIPE

meets unusual requirements in Vancouver's Borden Ave. Trunk Sewer

The versatility of concrete pipe aided in the solution of several difficult problems encountered in the installation of the new Borden Ave. Trunk Sewer in Vancouver, B. C. For example, engineers computed that if the sewer followed the grade of the ground profile, the resulting 20 ft. per second velocity would be too great. A series of low gradient stretches connected by reverse verticle curves in concrete pipe proved to be the practical answer.

In many places, the trench went too deep to be excavated by power shovel alone (see photo at right). This resulted in extremely heavy overburdens. Concrete pipe has the rugged strength to withstand such loads. Other advantages: (1) strength to resist severe impact, (2) smooth interior surfaces for maximum hydraulic capacity and resistance to abrasion, (3) ***low annual cost.***



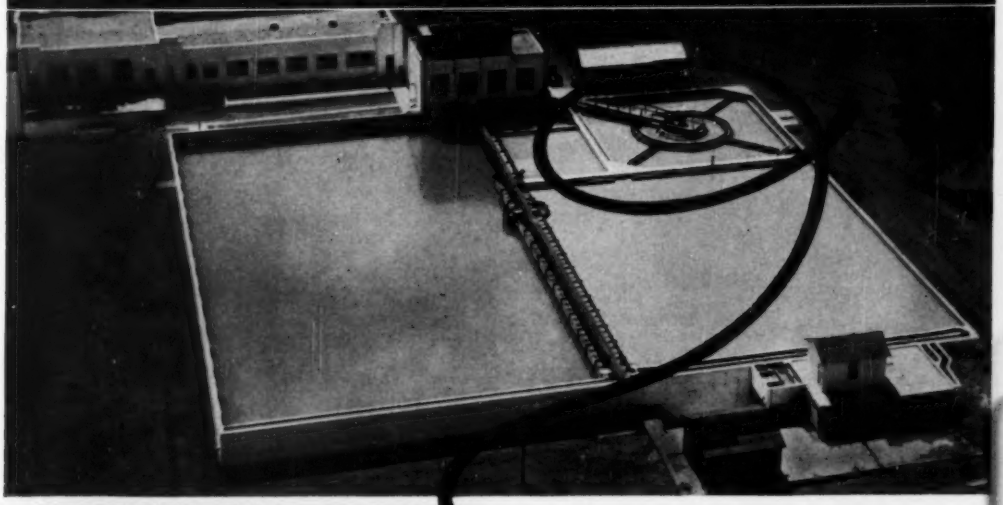
Special radius concrete pipe was manufactured in sections 3 ft. 9 in. long beveled 3 in. at each end to build a 50 ft. radius curve in the line (shown in photo at left). These special sections allowed the curve to be built without opening the joints. This is still another example of concrete pipe's versatility in meeting unusual requirements.

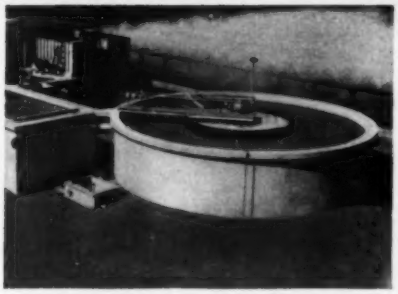
Approximately 8700 ft. of reinforced concrete pipe in seven sizes ranging from 30 in. to 84 in. were used in the Borden Ave. project. Photo at right shows 60-in. pipe being laid. Vancouver's highly successful experiences with concrete pipe are the result of a quality product and care in trenching, bedding and backfilling the pipe lines.

AMERICAN CONCRETE PIPE ASSOCIATION

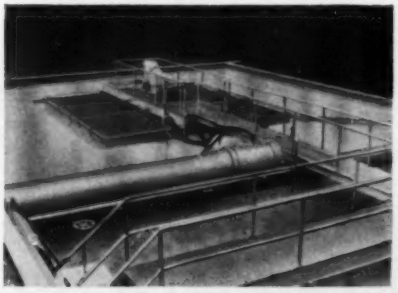
228 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

HOW TO TURN AN EXISTING BASIN





ACCELATOR installations: (Above) City of Gainesville, Fla., (Below) City of Coshocton, Ohio.



Into a Modern Water Conditioning Plant!

The ACCELATOR®
MAY BE ROUND OR SQUARE

At Muskogee, Oklahoma, a cyclone severely damaged the water treating plant. In rebuilding, they placed a *square* Accelator within the still-standing square settling basin. This saved the extra cost of building an external *round* basin. Today, the compact 70 ft. square ACCELATOR turns out 50% more clarified and softened water than the 210 ft. square settling basin did before! ★ Square, or round, the Accelator gives *any* municipality the means of converting turbid or hard water into a sparkling, clear, soft effluent. Over 1100 Accelator installations economically treat more than *One Billion* Gallons of water *every day!* Get all the facts.

SEND FOR..

our colorful new 28-page Bulletin No. 1825.- It's packed with vital information about this better, more economical way to condition water.

INFILCO

BETTER WATER CONDITIONING AND WASTE TREATMENT SINCE 1894

INFILCO INC.

GENERAL OFFICES - 325 WEST 25th PLACE - CHICAGO 16, ILLINOIS

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

You can lay "Century®" Pipe quickly—at less cost!

Actual on-the-job photographs show how even unskilled labor can lay easy-to-handle K&M "Century" Asbestos-Cement Pipe in less time, without special laying equipment.

STORE IT wherever convenient—K&M Pipe is lightweight and easy-to-haul; it can be moved quickly without special handling equipment.

NEED A SHORT LENGTH? Cut it right on the job! No torches, no special vises, no cranes needed—K&M Pipe is quickly fitted!

LOWER AWAY! Note that only two men are needed to comfortably handle these full-length sections. This is time-saving, money-saving laying!

STRAIGHT RUNS like this—or curves up to 5° deflection per pipe length—are quickly laid with K&M Simplex couplings.

The "Century" Simplex Coupling—simplicity itself

The "Century" Simplex Coupling is of the same composition as "Century" Pipe—asbestos fiber and cement. Two specially compounded round rubber gaskets are all that is required to make a permanent seal between pipe and coupling. The coupling is pulled into position quickly and easily by ordinary labor.

Before you specify or buy any water main, get the dollar-saving facts on K&M "Century" Asbestos-Cement Pipe. Your request for information will get prompt attention.

K&M "Century®" ASBESTOS-CEMENT PIPE

Nature Made Asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

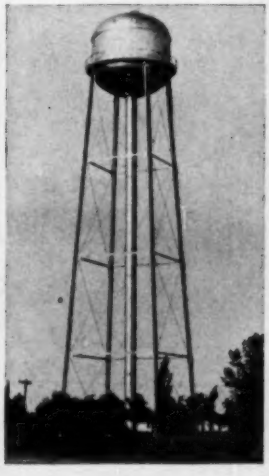
KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

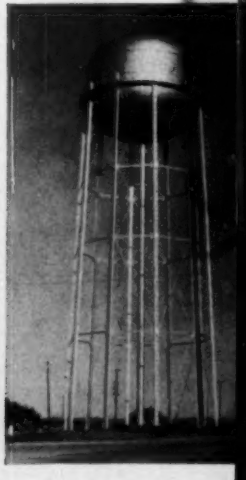
WHERE **Appearance** COMBINES WITH **Economy**

PITTSBURGH • DES MOINES

Double-Ellipsoidal *Elevated Steel Tanks*

Over a wide range of capacities up to a million gallons, the Pittsburgh-Des Moines Double-Ellipsoidal design offers low investment cost, excellent appearance and economical performance. It is one of the several P-DM Elevated Steel Tank types, meeting every water storage requirement.





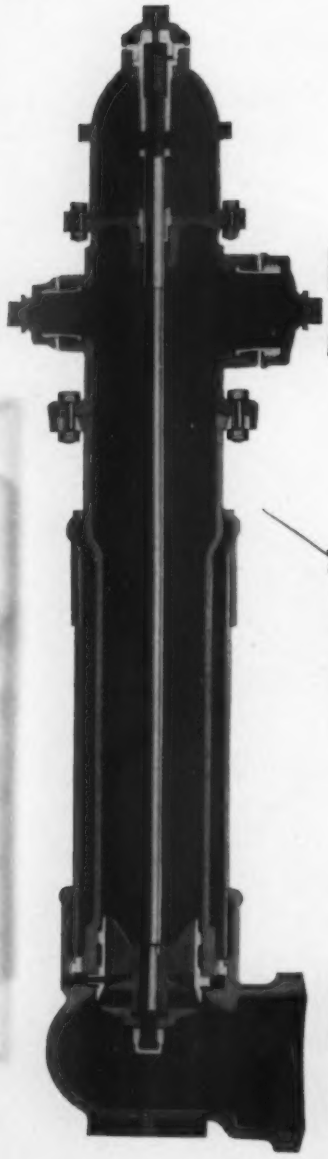
Write for your free copy of our latest 24-page brochure, detailing many important aspects of modern water storage.

PITTSBURGH • DES MOINES STEEL CO.

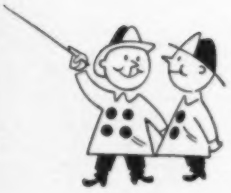
Plants at PITTSBURGH, DES MOINES and SANTA CLARA

Sales Offices at:

PITTSBURGH (25).....3418 Neville Island
NEW YORK (7)...Room 918, 270 Broadway
CHICAGO (3), 1222 First National Bank Bldg.
DES MOINES (8), 919 Tuttle Street
DALLAS (1), 1223 Praetorian Bldg.
SEATTLE.....926 Lane Street
SANTA CLARA, CAL.....625 Alviso Road



FEWER WORKING PARTS MEAN GREATER DEPENDABILITY



The simplicity of construction of Mathews Modernized Hydrants is an important factor in their length of service. There are Mathews Hydrants in operation today that were installed over 70 years ago.

MATHEWS HYDRANTS

Made by R. D. Wood Company

Public Ledger Building, Independence Square, Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

THE FIREMAN'S FRIEND

MATHEWS MODERNIZED HYDRANTS SET THE PACE: All working parts contained in replaceable barrel • Stuffing box cast integral with nozzle section • Head can be turned 360° • Replaceable head • Nozzle sections easily changed • Nozzle levels raised or lowered without excavating • Protection case of "Sand-Spun" cast iron for extra strength, toughness, elasticity • Operating thread only part to be lubricated A modern barrel makes an old Mathews good as new

FOR WATER FLUORIDATION

depend on the uniform high purity of BLOCKSON Chemicals

BLOCKSON CHEMICALS

BLOCKSON sodium fluoride

FORMULA: NaF

STRENGTH: *98% NaF*
45% F
pH of 1% solution 6.5

SOLUBILITY: *60°F. 4 parts in 100 parts water*

Blockson Sodium Fluoride has a minimum purity of 98%. Fluorine content 45%. It is a white, free flowing crystalline product supplied in anhydrous powdered or crystalline form as listed below.
The dust-free crystal grade can be used as a bed through which water is percolated to form a saturated solution of Sodium Fluoride.

GRADES: **Powder, White:**
99% through 200 mesh
97% through 325 mesh
Density 65 pounds/cubic foot

Crystal, White:
100% through 20 mesh
2% through 60 mesh
Density 90 pounds/cubic foot

BLOCKSON sodium silicofluoride

FORMULA: Na_2SiF_6

STRENGTH: *98.5% Na_2SiF_6, 60% F*
pH of saturated solution 3.5

SOLUBILITY: *75°F. .75 parts in 100 parts water*

Blockson Sodium Silicofluoride is a white free flowing, odorless, anhydrous powder. Fluorine content 60%. When added to water, the alkalinity in the water dissociates the Sodium Silicofluoride to Sodium Fluoride.
Blockson Sodium Silicofluoride will be generally available for water fluoridation in ample quantities at low cost.

GRADES: **Standard, White:**
100% through 40 mesh
95% through 100 mesh
Density 72 pounds/cubic foot

BLOCKSON IS ONE OF THE LARGEST PRODUCERS OF THESE TWO PRODUCTS—ASSURING A DEPENDABLE SOURCE OF SUPPLY
Write for Samples

BLOCKSON CHEMICAL CO. • JOLIET, ILLINOIS

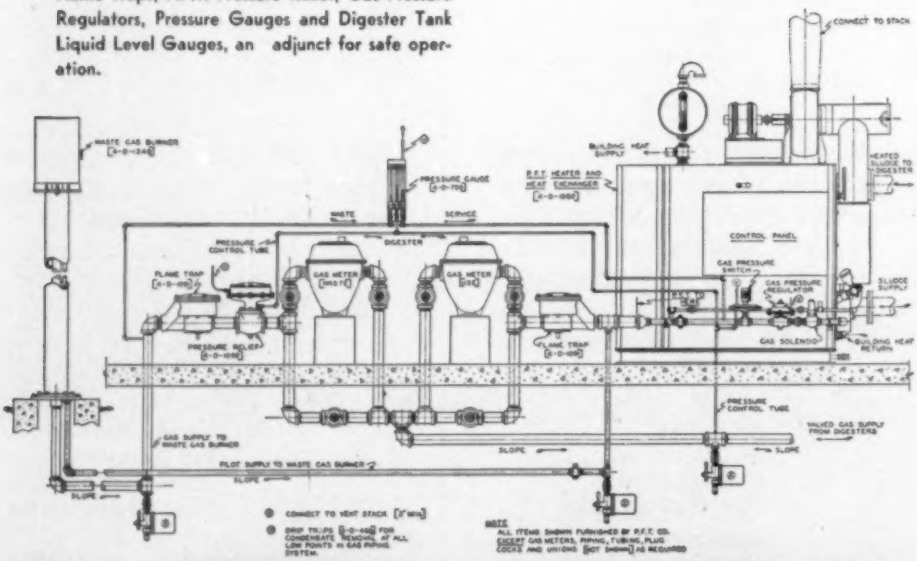
If it's P.F.T.

SEWAGE SLUDGE GAS SAFETY EQUIPMENT

it is SAFE!

RESEARCH that started twenty years ago has culminated in the P.F.T. line of gas safety equipment of today. P.F.T. offers complete equipment for safely utilizing gas generated in the sludge digestion tanks. The fire and explosion hazards have been eliminated. These equipments include: P.F.T. Waste Gas Burners, P.F.T. Flame Traps, P.F.T. Pressure Relief, Gas Pressure Regulators, Pressure Gauges and Digester Tank Liquid Level Gauges, an adjunct for safe operation.

Well over a thousand plants are protected by P. F. T. Gas Safety Equipment. A typical gas piping arrangement for a single digester installation is detailed below. Bulletin 221 describes these protective devices.



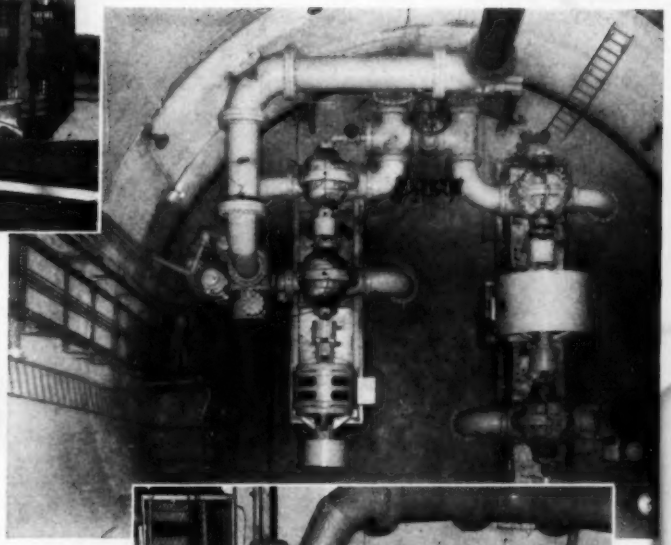
PACIFIC FLUSH TANK CO.

P.F.T.

SEWAGE TREATMENT EQUIPMENT EXCLUSIVELY SINCE 1893

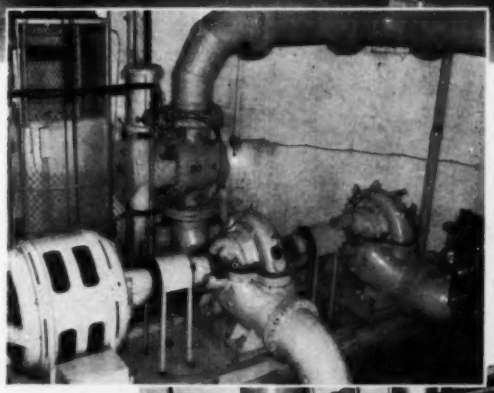
4241 RAVENSWOOD AVENUE CHICAGO 13, ILLINOIS

NEW YORK • LOS ANGELES • SAN FRANCISCO • CHARLOTTE, N. C. • DENVER • TORONTO



ROTOVALVES

by
S. MORGAN
SMITH
COMPANY

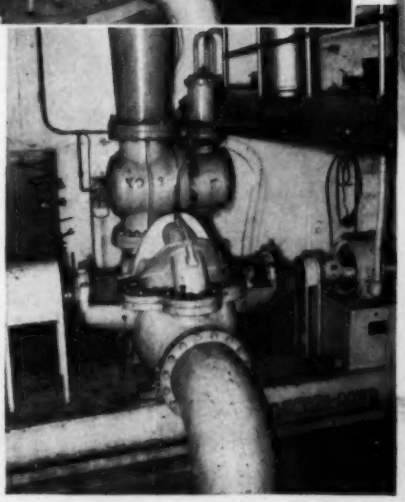


In River Pumping Station
CITY of COVINGTON
. Kentucky .

PICTURES speak louder than words!

The Pump House sets over a dry well—80 feet deep and 40 feet in diameter. The pumps are located at the bottom of the pit, which is at the level of the lowest river stage. In time of flood, the water rises as much as 70 feet. Two 10 m.g.d. pumps deliver water at 400 foot head, through 4,000 feet of 30" line to the Raw Water Reservoir at the Filtration Plant.

Here is a pumping station where reliability of equipment is unusually essential. Five other Rotovalves are installed in the Covington Water Works System!



S. MORGAN SMITH COMPANY
YORK • PENNSYLVANIA

Why buy piping the hard way?

Get it from one source...CRANE

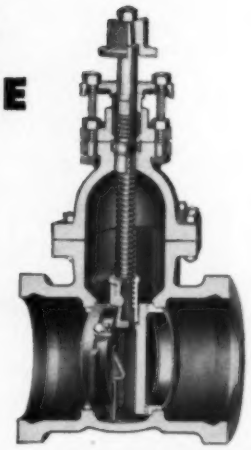
SMOOTHER, MORE POSITIVE OPERATION

You can expect the best operating characteristics from Crane A.W.W.A. Iron Body Gate Valves. They're Crane-engineered throughout to assure smooth, positive flow control on every water distribution service.

Note the Crane parallel seat and double disc construction. Depending on valve size, either hook controlled wedges or spreaders force the discs outward to assure pressure-tight closure. Discs and renewable body seat rings are brass or brass faced to prevent corrosion.

Crane oval-shaped body-bonnet design assures maximum strength for all recommended services. Two-piece gland maintains uniform pressure on packing; prevents binding on stem; avoids frequent stuffing box maintenance. Valves can be motor or cylinder operated; equipped with gears and by-pass. Flanged and hub ends available. See your No. 49 Crane Catalog.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

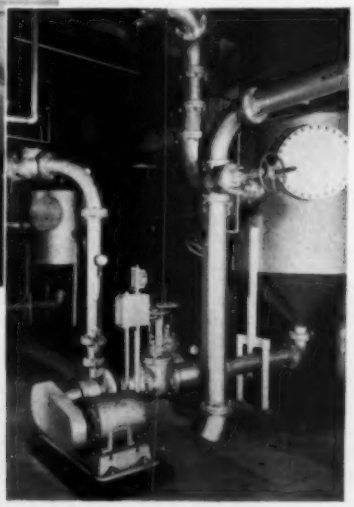


No. 480½, Non-Rising Stem. Cold water working pressures: 12-inch and smaller, 200 pounds; 14-inch and larger, 150 pounds. Sizes: 2 to 36-inch.

PIPING SYSTEMS CAN BE 100% CRANE-EQUIPPED . . . WITH JUST ONE PURCHASE ORDER

MAIN PIPE GALLERY *in municipal water treatment plant equipped with cylinder operated Crane 8-in. re-wash valves, 14-in. effluent valves and 24-in. wash valves.*

LINES TO MOISTURE TRAP DRAINS *in sewage disposal plant using Crane Iron Body Gate and Check Valves.*

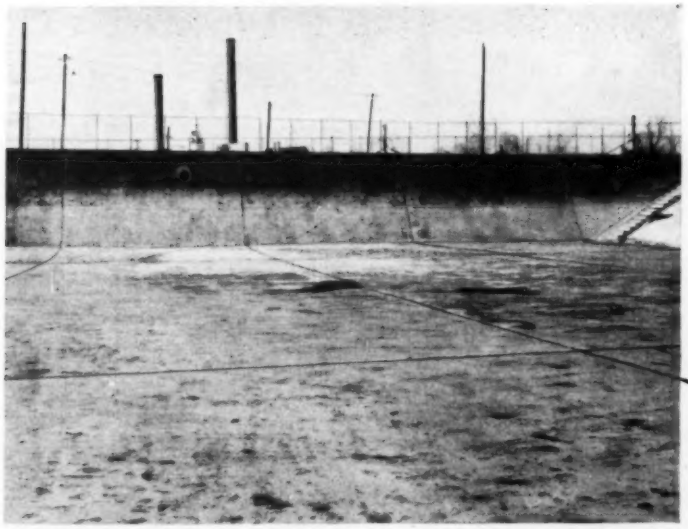


EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

NO-OX-ID... *Guardian* OF YOUR WATER SUPPLY



Saved—200,000 Gallons

OF FINISHED WATER PER DAY

The porosity of the joints and seams of this 5,000,000 gallon reservoir was responsible for the daily loss of as many as 200,000 gallons of treated water—a sizable loss of time, materials and money, as well.

Dearborn was consulted . . . the following steps taken. (1) The old sealing material was removed from the joints and seams which were then blown out with compressed air and dried with kerosene torches. (2) Oakem was then tamped into the joints and seams which were then filled to a thickness of three inches with Dearborn NO-OX-ID.

One year later the joints had held up, the NO-OX-ID retained its life, leakage was completely stopped, engineers reported NO-OX-ID "the best material they had ever seen." Why not profit by Dearborn's broad experience in reservoir protection and rust prevention? A Dearborn engineer will gladly discuss your problem with you.

DEARBORN CHEMICAL COMPANY
310 S. Michigan Ave., • Chicago 4, Ill.

NO-OX-ID VERSUS WATER

A valuable book that will demonstrate the many benefits of NO-OX-ID in the water works field. Write for copy.

Dearborn Chemical Company
310 S. Michigan Ave., Chicago 4, Ill.
Dept. WS
Please send a copy of your book "NO-OX-ID Versus WATER."

Name.....

Title.....

City.....

State.....

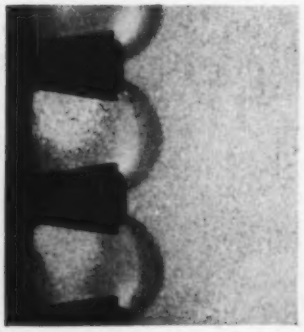
Dearborn
Reg. U. S. Pat. Off.
THE ORIGINAL RUST PREVENTIVE
NO – OX – ID
IRON RUST

EVERDUR
for well screens

Famous for exceptional resistance to corrosion, high strength, and adaptability to money-saving fabricating methods.

Cross sections, slightly enlarged. Everdur rod-and-wire welds made at 15 to 28 per second.

Well screen being fabricated by unique method of resistance welding.



Micrograph of lengthwise section showing excellent fusion of Everdur resistance welds.

Johnson Well Screen, 16" O.D. 35' long, being lowered into well casing.

Extremely resistant to corrosion. Most water works engineers know that Everdur® is stubbornly resistant to corrosion. Everdur Well Screens have been a standard product of Edward E. Johnson, Inc., St. Paul, Minn., for more than 20 years. Their service records add further confirmation to many other reports proving the suitability of Everdur for water works and sewage treatment equipment.

High strength, too. It's pretty well known, too, that Everdur Alloys are strong and highly resistant to fatigue.

Exceptional weldability. But not everybody knows that Everdur has unusually good oxy-acetylene and electric welding qualities. That means economy in fabricating lightweight, low cost, wrought metal assemblies.

Everdur is available in practically all wrought forms including sheets, plates, rods and bars; and in structural shapes such as angles, channels, tee shapes and "I" beam sections; also in casting ingots. If you would like to know more, just write to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

Where corrosion resistance counts —use Everdur

ANACONDA®
COPPER-SILICON ALLOYS

®Reg. U. S. Pat. Off.

Typical Installation of THE PROCESS OXIDATOR

General view of Bio-Oxidation plant at Hemet, California. Designed for population of 7800. Has two 40 Ft. dia. Oxidators arranged for single or dual stage bio-oxidation. Ralph S. Brooks and James G. Carwile, Consulting Engineers. Karl P. Teget, Contractor.

Primary Oxidator
(Note skimming device)

Secondary Oxidator

Water reclaimed from sewage is used for irrigation

Announcement!

Process Engineers Incorporated are pleased to announce the appointment of the Pacific Flush-Tank Company as representatives for the Process Oxidator

With first hand information readily available regardless of locale, every engineer interested in modern sanitation should investigate this revolutionary one tank combination aeration, coagulation and sedimentation process. As exclusive Eastern and Middle Western agents for the Process Oxidator, "P.F.T." have again demonstrated the progressive attitude that has marked their continual advancement in the field of sewage treatment since 1893. Process Engineers Incorporated will continue to service demands for the Process Oxidator in the West where installation after installation has resulted in lower initial expenditures and higher removals at a greatly reduced cost per PPM removed.

The Pacific Flush-Tank Company and Process Engineers Incorporated have available Bulletin 106 which gives full information about this new leader in sewage treatment. Both firms also maintain a staff of specialized Engineers who will be glad to assist you with your particular problem.

Proven Points of the Process Oxidator

- **Improved clarification**
- **Higher removal of suspended matter**
- **Increased grease removal**
- **Minimum scum handling**
- **Greater reduction in bio-chemical oxygen demand**
- **Elimination of odors by maintaining sewage in fresh condition**
- **Suited to processes involving chemical reactions**
- **Lower capital cost and upkeep**

PROCESS ENGINEERS INCORPORATED

821 MARKET STREET
SAN FRANCISCO 3, CALIF.

6381 HOLLYWOOD BLVD.
LOS ANGELES 28, CALIF.

EASTERN AND MIDDLE WESTERN REPRESENTATIVE:
PACIFIC FLUSH-TANK COMPANY • 4241 RAVENSWOOD AVE., CHICAGO 13, ILL.

for replacements or new installations

Specify CLOW

CAST IRON PIPE, FITTINGS, VALVES and SPECIALS In Sewage Plant Construction

CLOW FLANGED END FLAP VALVE—Also comes with Bell or Spigot End. Flap valves are bronze mounted, are superior in meeting most field conditions, may be easily dismounted for repairs if found necessary at any time.

ASSURED LONG LIFE

CLOW BELL END SLUDGE SHOE—Also comes with Flanged End. Improved Sludge Shoes are extra strong, have maximum sludge opening, and the flare reduces entrance losses to a minimum.

for a century or more

CLOW PRESSURE RELIEF VALVES—Bronzed mounted for smooth operation. Made with grated bottom to allow water only to enter tank. Can be made to any length desired.

CLOW FLANGE AND FLARE ELBOW—Are regularly furnished with flange faced and drilled to A.S.A. Class 125 Standard template. Bell and flare elbows can also be furnished.

CLOW SPECIAL CAST IRON PIPE AND FITTINGS

James B. Clow & Sons make a great many special cast iron fittings of irregular shapes in sizes up to 54", conforming to engineering details submitted by the purchaser and to meet the unusual requirements of pipe line specifications often presented in such types of construction as Filtration and Sewage Disposal Plants. Clow also manufactures Cast Iron Pipe in steel pipe sizes 3 through 10 inches (I.P.S. pipe) which has the same outside diameter as common steel pipe. I.P.S. pipe can be cut, threaded, and fabricated on the job with ordinary tools of the piping trade. Write for the Clow Catalog "Pipe Economy" which fully illustrates our line of Cast Iron Pipe, Fittings, Specials and Valves for use in sewage treatment plant construction. Ask Clow for price and delivery on your immediate needs.

CLOW CAST IRON PIPE FITTINGS

All types of Clow Cast Iron Pipe Fittings are offered in straight and reducing sizes for use with Bell and Spigot Joint, Mechanical Joint and Flanged Joint Cast Iron Pipe in sizes up to 24".

Illustrations below are Typical Fittings

CLOW BELL & BELL ONE EIGHTH BEND

CLOW MECHANICAL JOINT 90° ELBOW

CLOW 90° STANDARD FLANGED ELBOW

JAMES B. CLOW & SONS

201-299 North Talman Avenue

CAST IRON

Chicago 80, Illinois

National Cast Iron Pipe Division, Birmingham, Ala.; subsidiaries Eddy Valve Company, Waterford, N.Y.; Iowa Valve Co., Oskaloosa, Iowa

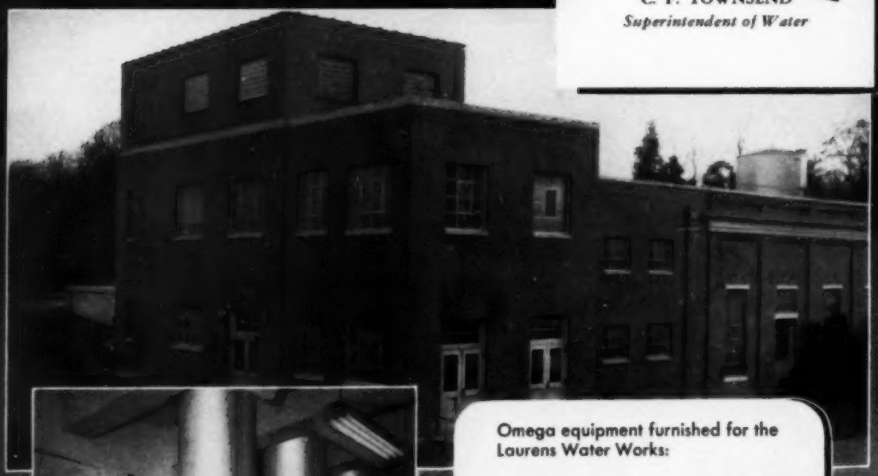
LAURENS, S. C.

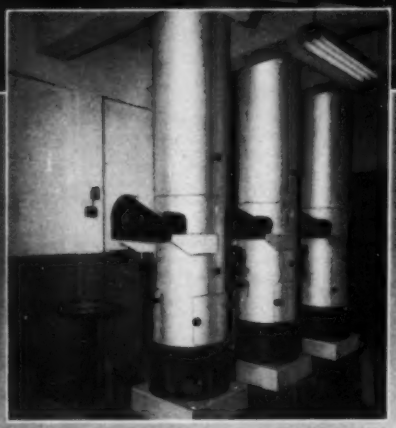
Water Works

(COMPLETED IN 1949)

WIEDEMAN & SINGLETON
Engineers
Atlanta, Georgia

C. P. TOWNSEND
Superintendent of Water





Omega equipment furnished for the Laurens Water Works:

3—No. 2 Universal Feeders for feeding alum and lime. Equipped with extension hoppers, hopper agitators, high speed mechanical mixers and dissolving chambers.

1—No. 3 Universal Feeder for feeding hydrated lime. Equipped with hopper agitators and mixing chamber.

This new addition to the Laurens Water Works provides an ample supply of high quality water to meet anticipated needs of the community for the next generation. The new building, erected by Fiske-Carter Construction Co. of Spartanburg, S. C., is modern in every detail and is equipped with the most up-to-date equipment to provide as nearly automatic operation as practical. Omega Universal Feeders were installed for the automatic feeding of alum and hydrated lime in accurate, predetermined amounts. To conserve operators' time and contribute to the high efficiency of the plant, these machines are equipped with large extension hoppers, hopper agitators, and mechanical mixers in dissolving chamber. For complete information and bulletins describing Omega water works equipment, address Omega Machine Company, (Division of Builders Iron Foundry), Providence 1, R. I.

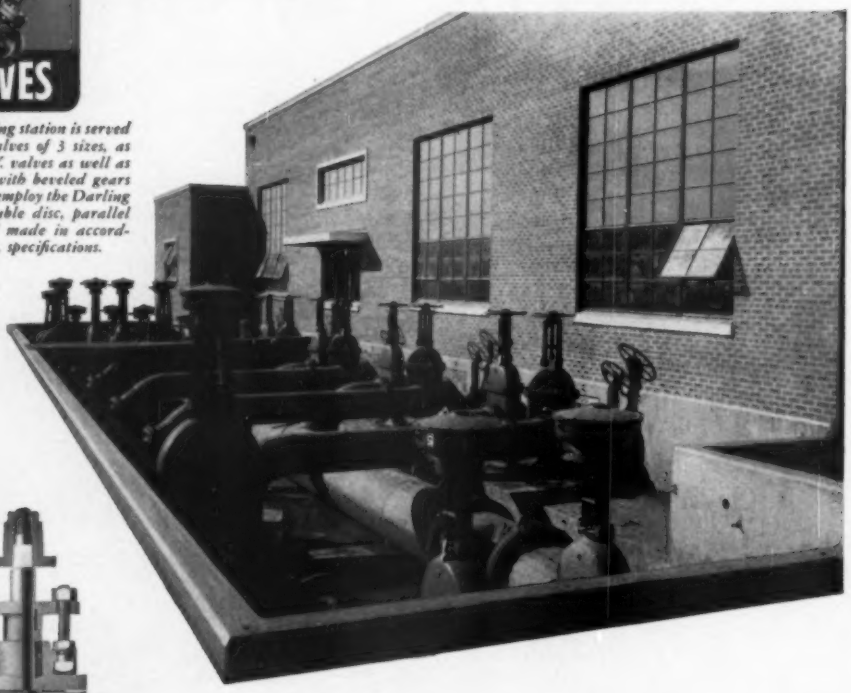
THE LAST WORD IN FEEDERS

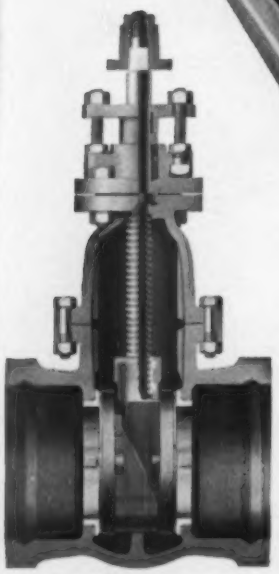
OMEGA

DARLING VALVES

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

This modern pumping station is served by Darling gate valves of 3 sizes, as shown—20" O.S.&Y. valves as well as 30" and 36" sizes with beveled gears and gear cases. All *employ the Darling fully revolving, double disc, parallel seat principle, and made in accordance with A.W.W.A. specifications.*





Note rugged simplicity of this unique Darling principle—just four sturdy working parts . . . two plain interchangeable no-pocket discs and two husky wedges. Assembly and maintenance is extremely easy and foolproof.

Time and money ahead

THIS new municipal pumping station gains a unique advantage proved in hundreds of similar operations throughout the country. Because these gate valves are Darlings . . . *featuring Darling's fully revolving, double disc, parallel seat principle* . . . the city as well as the water department will be time and money ahead years on end.

If you haven't yet checked into Darling gate valves of this type (shown in cutaway view at left) we'd like to give you *all* the facts on the distinctive features that always add up to . . .

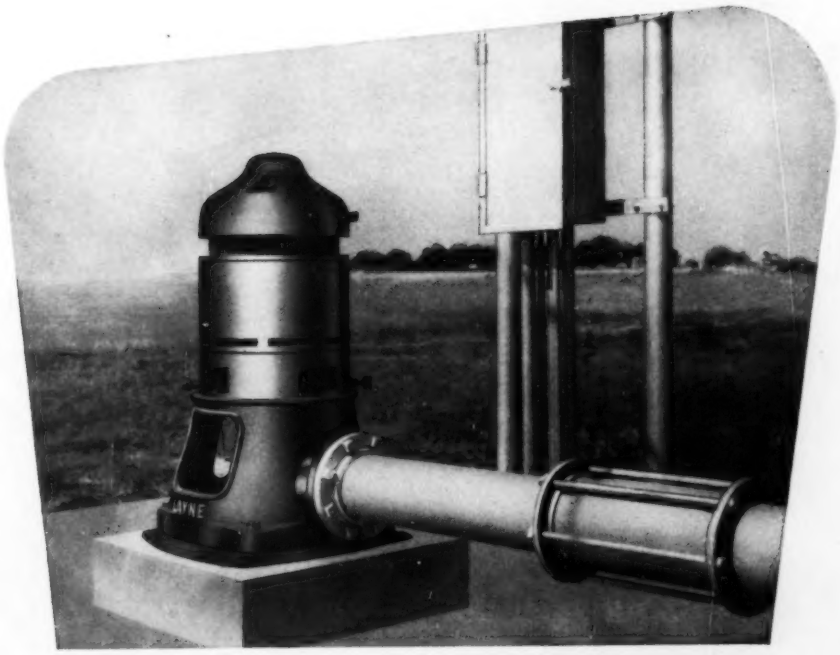
1. Positive, easier closing. 2. Automatic adjustment for valve body distortion. 3. Elimination of disc-to-seat galling. 4. Uniform wear distribution. 5. Greater service life with far less maintenance.

SEND FOR BULLETIN

Darling's latest bulletin is full of helpful information and describes Darling valves of *all* types for every normal or unusual service.

DARLING VALVE & MANUFACTURING CO.

Williamsport 11, Pa.



For Lasting Quality Here Is America's Top Value

If your requirements call for a Well Water System of utmost dependability, and one that must serve for a long period of years with little or no upkeep expense, you are urged to check the features of those built by Layne. The experience of nearly seventy-five years has gone into their design and construction. With thousands of installations scattered throughout the world, Layne has had an unmatched opportunity to find, correct and greatly strengthen every possible weak point of construction. Constant improvement of design has made them the world's most efficient.

You can also be sure of lasting quality! Extensive research for, and the use of the most suitable metals for all parts has given these famous well water systems an extraordinarily long life under all conditions. Feature for feature, Layne Well Water Systems are acknowledged to be the world's finest. No experienced engineer will question that statement.

Layne will gladly, without obligation, give helpful information on any water supply problem. For further information, literature, etc., address

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

LAYNE ASSOCIATED COMPANIES

ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

LAYNE

WELL WATER SYSTEMS

VERTICAL TURBINE PUMPS

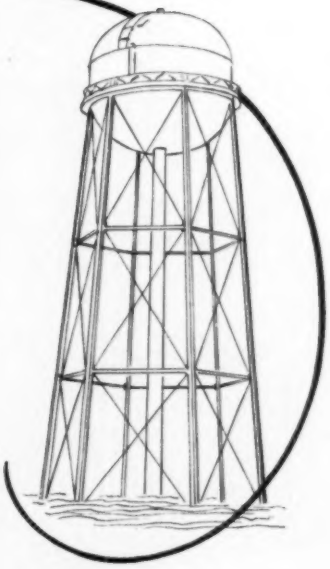
Your Community

NEEDS DEPENDABLE

WATER LEVEL CONTROL

BY

GA

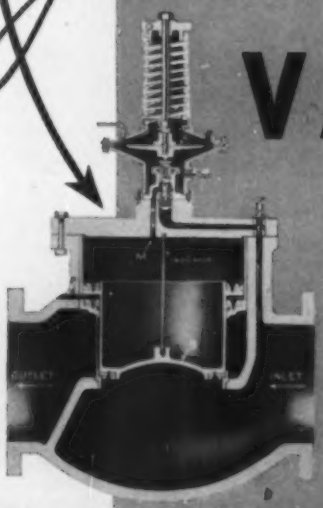


CUSHIONED

Golden-Anderson

ALTITUDE

VALVES



Golden-Anderson Water Level Control Valves give the safety and protection needed for all elevated tanks and reservoirs. These valves maintain a uniform water level and can additionally be arranged to automatically function pumps, electrical devices or signal lights. The air and water cushioning in all Golden-Anderson valves prevents any shock or hammer and permits valve to operate smoothly at all times. *Write for technical data.*

GOLDEN-ANDERSON *Valve* SPECIALTY CO.

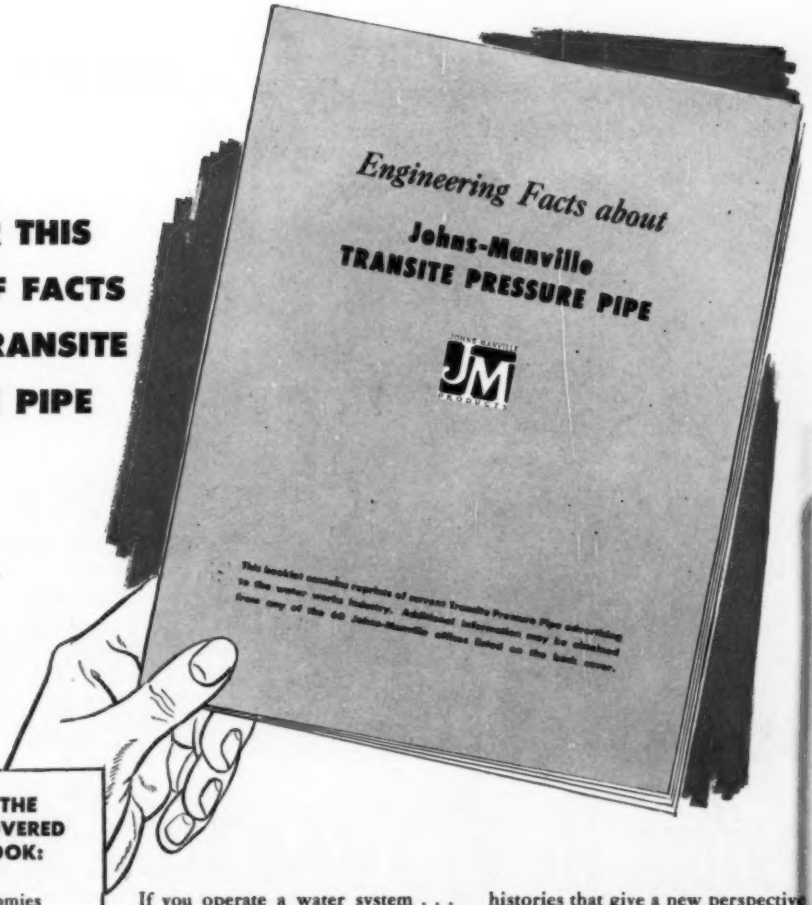
2075 Keenan Building, Pittsburgh 22, Pa.

LIFE AND PROPERTY PROTECTION

VALVES

FOR OVER 50 YEARS

SEND FOR THIS DIGEST OF FACTS ABOUT TRANSITE PRESSURE PIPE



SOME OF THE SUBJECTS COVERED IN THIS BOOK:

- Installation Economies
- Carrying Capacity
- The Simplex Coupling
- Making Service Connections
- Resistance to Corrosion —an Index of Long Life
- Case Histories
- Dimensions and other useful data

If you operate a water system . . . or are concerned with the design or construction of water works projects you'll find this digest of facts about Johns-Manville Transite* Pressure Pipe helpful.

A compilation of the advertisements in our current "Engineering Facts" series, it presents concise, factual information about Transite's many economic and engineering advantages . . . includes informative case histories that give a new perspective on how this asbestos-cement pipe meets today's requirements for a modern, efficient water carrier.

In addition, it contains dimensions and other useful data about Transite Pressure Pipe which you'll want to have in your files. A copy is yours for the asking. Write Johns-Manville, Box 290, New York 16, N. Y. or use the coupon below.

*Transite is a registered Johns-Manville trade mark

Johns-Manville
TRANSITE PRESSURE PIPE

JM

Johns-Manville
Box 290, New York 16, N. Y.

Send me a copy of "Engineering Facts about Johns-Manville Transite Pressure Pipe" (TR-78A).

Name_____

Organization_____

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W3-7

COSTS LESS

...because Aluminum Lasts!

ALCOA FORGED ALUMINUM MANHOLE STEPS AND LADDER RUNGS

These new aluminum steps will save you money, help you avoid accidents. Because of their high resistance to corrosion, they last years longer than ordinary steps, require little or no maintenance. They're forged from an extra strong aluminum alloy, will not deform permanently under loads as high as 1,000 pounds. Aluminum is non-sparking. So Alcoa Steps are safe in explosive atmospheres. Grooved tread gives a firm foothold.

Available in three sizes for easy installation in any type of masonry, outside or inside. Call your nearby Alcoa Sales Office for information and prices. Or write for free folder. ALUMINUM COMPANY OF AMERICA, 1809G Gulf Bldg., Pittsburgh 19, Pa.

SAFE • NON-SPARKING • STRONG • DURABLE • ECONOMICAL

the *NEW* COLEMAN AC pH METER

offering Coleman precision . . . plus line operating convenience

- **DIRECT READING** . . . Dual scale meter calibrated 0-8 and 6-14 for continuous, direct reading of pH or millivolts. One switch for scale selection.
- **ACCURATE** . . . to 0.05 pH with proper technique. Unaffected by line voltage variations . . . fully protected from moisture and humidity.
- **FAST** . . . Instant reading . . . just flip the switch and the needle indicates the exact pH or millivolts. No annoying creep or oscillation.
- **STABLE** . . . Complete Stability 5 minutes after starting. Settings remain constant and reproducible over long periods without resetting or restandardizing.
- **CONVENIENT** . . . Easy-to-operate—Easy-to-read case is stain and corrosion proof.

Write today for Bulletin FB-221 for a full description of this New Coleman contribution to laboratory accuracy.

COLEMAN INSTRUMENTS *famous firsts . . . .* pH ELECTROMETERS · ELECTRONIC PHOTOFLUOROMETERS CHEMISTS SPECTROPHOTOMETERS · PHOTO NEPHELOMETERS · ANOXIA PHOTOMETERS

318 MADISON STREET, MAYWOOD, ILLINOIS

For abrasive ladings A.C.F. Lubricated Plug Valves with clear full circular ports* are ideal. Compact size is retained only through cylindrical plug design...straight-through flow with same shape and cross section as the pipe. Quick quarter turn to open or close...no exposed seats. For every reason A.C.F. Valves should be your first choice.

*Also offered with full area rectangular ports.

A.C.F. CYLINDRICAL FULL PIPE AREA LUBRICATED **PLUG VALVES**

Representatives in more than 50 principal cities.

Ideal for sewage operations. Ask for catalog 4-WS. American Car & Foundry Co., Valve Division, 1501 Ferry Ave., East, Detroit, Michigan.

THE FIRST MECHANICAL JOINT TAPPING SLEEVE AND VALVE

ELIMINATES { MELTING / POURING / CAULKING

A new all Mechanical Joint Tapping Sleeve and Valve, installed quickly and easily even by untrained workmen. The only installation equipment necessary is a 10" ratchet wrench and a standard open end wrench.

There are no joints to pour or caulk.

Installation can be made in wet trenches in any kind of weather.

The "Stuffing Box" type joints require no cutting or scarfing of rubber gaskets on job.

Assemble Sleeve on main—attach the Valve, the installation is complete, ready for tapping and the joints are permanently bottle-tight.

32

GATE VALVES
CHECK VALVES
FIRE HYDRANTS
INSERTING VALVES
TAPPING SLEEVES AND VALVES
WATER SERVICE BRASS GOODS

THE A. P. SMITH MFG. CO.
ESTABLISHED 1896
EAST ORANGE, NEW JERSEY

FLOOR STANDS
INDICATOR POSTS
TAPPING MACHINES
INSERTING MACHINES
PIPE CUTTING MACHINES
CORPORATION TAPPING MACHINES

A Dresser-coupled steel line delivers water cheaper...

The cheapest way to deliver water to the place where it turns into revenue is with a Dresser-Coupled steel line—the line that:

- **Cuts installation costs**
- **Cuts leakage losses**
- **Cuts maintenance costs**

When you're fighting a water shortage, you want pipe and joints that go in fast, deliver *all* the water you pump. You want to lay up to 2,000 or more feet of pipe per day with each small crew, use a minimum of expensive heavy equipment and have the assurance of foolproof, *tight* joints. Steel pipe, Dresser-Coupled, gives you these advantages.

Add the benefits of modern, glass-smooth linings; tough, shatterproof, long-lived steel pipe, and flexible Dresser Couplings which *absorb* underground stresses—you have made an investment in permanence which will save you many thousands of maintenance dollars in the years to come.

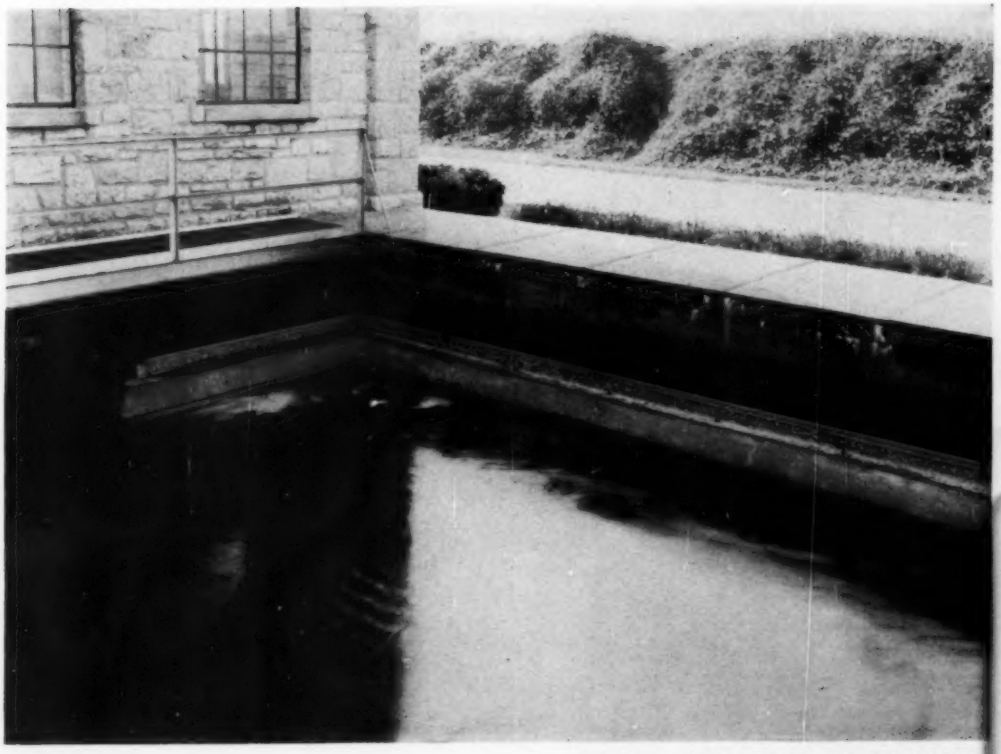
Ask your Dresser Sales Engineer or write today for literature.

Near **SAN DIEGO, Cal.,** this 16", six-mile branch of the San Diego Aqueduct was laid fast to help relieve a drought-caused water shortage.

BE SURE **you get the best line at the best price. Put steel pipe and Dresser Couplings in your specifications.**

DRESSER "FLEXIBLE-TIGHT" COUPLINGS

Dresser Manufacturing Division, 59 Fisher Avenue, Bradford, Pa. (One of the Dresser Industries). In Texas: 1121 Rothwell Street, Houston. In Canada: 629 Adelaide St., West, Toronto, Ontario. Sales Offices: New York, Chicago, Houston, Philadelphia, San Francisco.



Alcoa Aluminum Weirs installed at Columbus, Ohio, in 1937.

THIRTEEN-YEAR UPKEEP: ZERO

They never paint weirs in Columbus, Ohio. The superintendent of sewage treatment says of the Alcoa Aluminum Weirs installed in 1937," . . . have given excellent service with no maintenance for the past 13 years".

Not only weirs, but rotary distributors—scum collectors—bar screens and architectural products of Alcoa Aluminum are eliminating painting and maintenance while improving appearance in plants all over the country.

Your builder will be glad to fabricate sewage equipment of light, lasting Alcoa Aluminum. You only need specify Alcoa in your designs. For more information, mail the coupon below to ALUMINUM COMPANY OF AMERICA, 2162G Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA

FIRST IN ALUMINUM

Gentlemen:
Please send more information to:

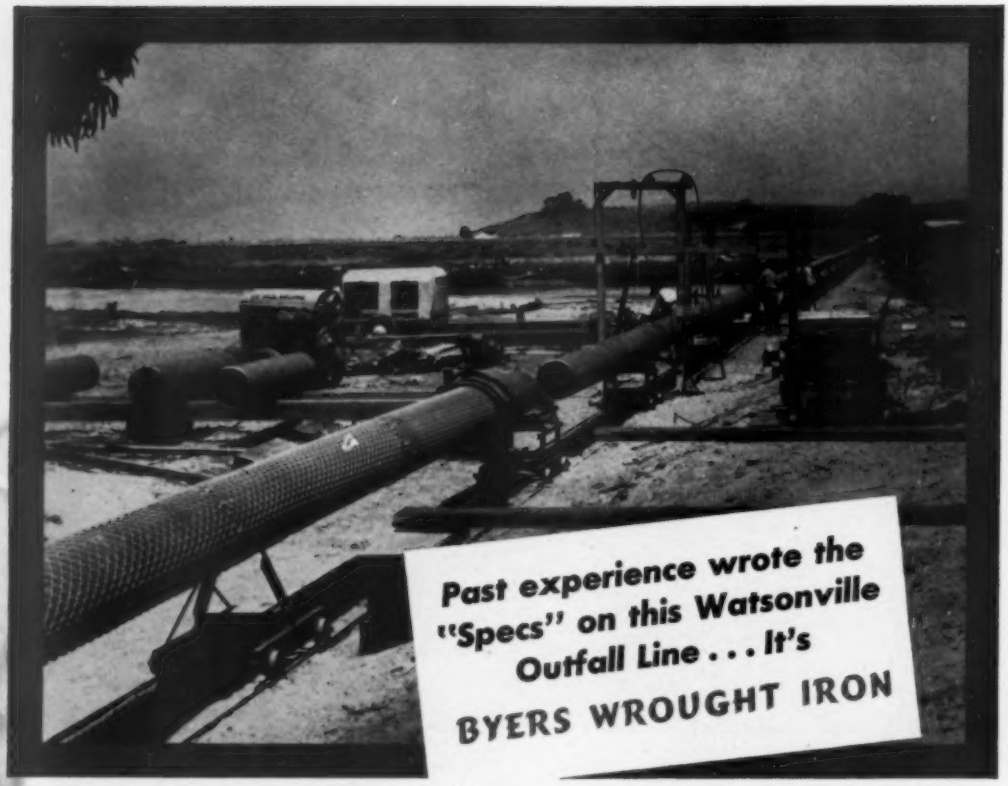
Name_____

Title_____

Company_____

Address_____

City_____ State_____



When the city of Watsonville, Cal., made plans for a new sewage outfall line, the designers had the finest guide in writing specifications that anyone could ask: a previous outfall line, installed 25 years ago, and still in good condition.

With this to go on, the City Engineer, H. B. Kitchen, used 16-inch Byers Wrought Iron pipe. To aid in overcoming buoyancy, and to give extra protection against the abrasive action of shifting sands, the outermost 800 feet of the line was wrapped with steel mesh, and covered with gunited sand and cement. The next 600 feet was wrapped with steel mesh, inclosed with 8-gage steel casing, and the space filled with cement grout. As successive lengths were added by welding, the line was towed out to sea, riding on the small carriages shown in the illustration. The pipe was fabricated from ⅜ and ½-inch wrought iron plates by Pittsburgh-Des Moines Steel Company. Installation was handled by Granite Construction Company.

The use of wrought iron for outfall lines is wide-spread, and the reason is found in the excellent service records that the material has established. Wrought iron has an unusual structure, that makes it unusually effective against the corrosion encountered both from sea water, and from sewage. Tiny fibers of glass-like silicate slag, threaded through the body of high-purity metal, halt and disperse corrosive attack, and so discourage pitting. The fibers also anchor the initial protective scale, which shields the underlying metal.

Descriptions of several wrought iron outfall line installations are included in our bulletin WROUGHT IRON FOR SEWAGE TREATMENT AND DISPOSAL INSTALLATIONS. We will be glad to send a copy on request, and to provide added detailed information if you wish it.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Salt Lake City, San Francisco. Export Division: New York, N. Y.

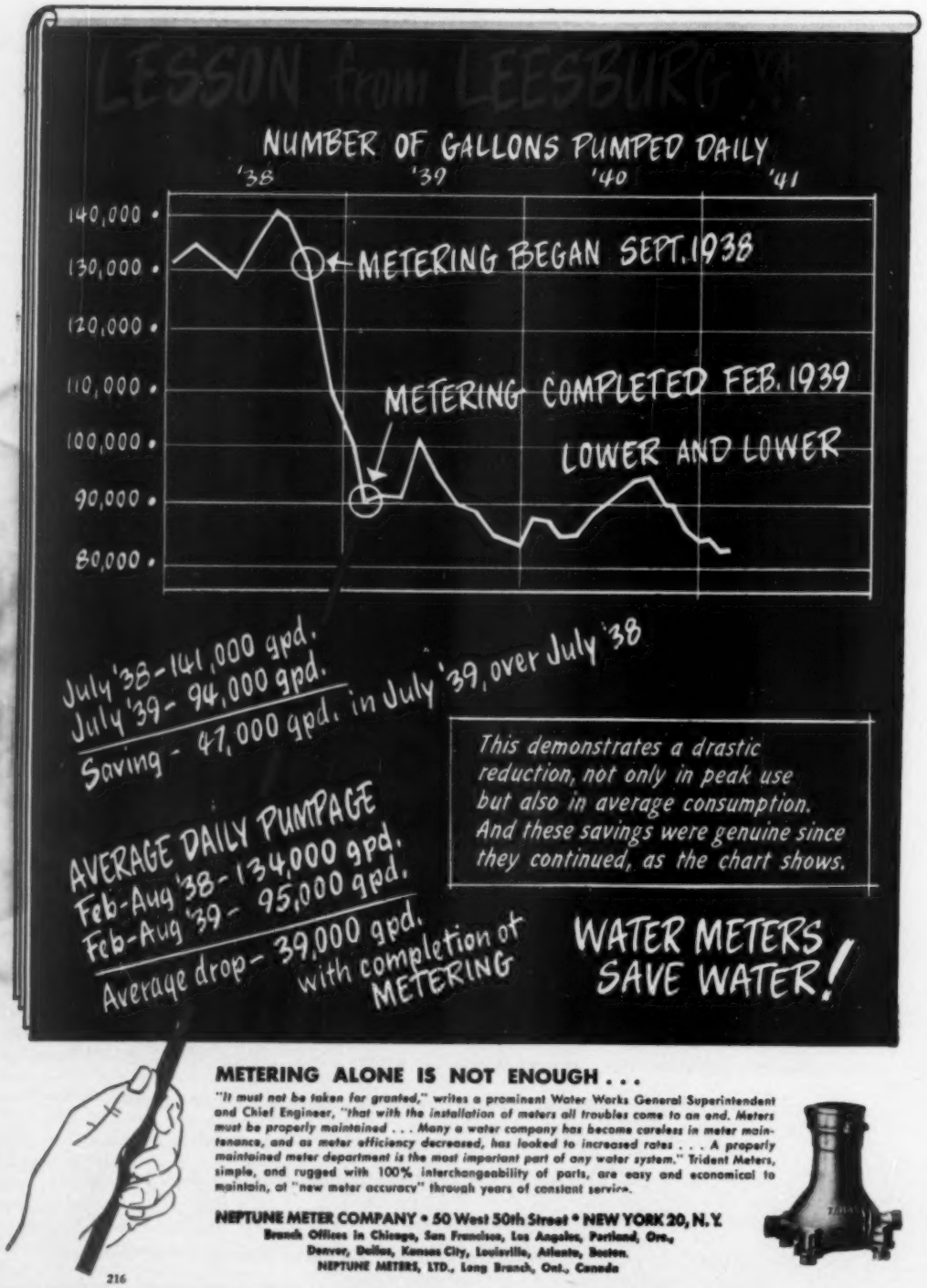
CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

Painted for U. S. Pipe & Foundry Co. by Dean Cornwell

U.S.
cast iron
PIPE
FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

You have heard it said that "cast iron pipe is cast iron pipe"—a pipe that gives dependable, long-lived, low-cost service—no matter who makes it. And that is basically a true statement. Why then do we have customers who have regularly purchased from us for over 50 years? One reason is that we have pioneered developments that have resulted in process and product improvements over the years, just as today, through research and development, we strive still further to improve our product. Another reason is that we have been able to give our customers the type of service needed to meet their particular requirements. **United States Pipe and Foundry Co., General Offices: Burlington, New Jersey. Plants and Sales Offices Throughout U.S.A.**


LESSON from LEESBURG, VA.
NUMBER OF GALLONS PUMPED DAILY
'38
'39
'40
'41
140,000
130,000
120,000
110,000
100,000
90,000
80,000
METERING BEGAN SEPT. 1938
METERING COMPLETED FEB. 1939
LOWER AND LOWER
July '38 - 141,000 gpd.
July '39 - 94,000 gpd.
Saving - 47,000 gpd. in July '39, over July '38
AVERAGE DAILY PUMPAGE
Feb-Aug '38 - 134,000 gpd.
Feb-Aug '39 - 95,000 gpd.
Average drop - 39,000 gpd. with completion of METERING
This demonstrates a drastic reduction, not only in peak use but also in average consumption. And these savings were genuine since they continued, as the chart shows.
WATER METERS SAVE WATER!

METERING ALONE IS NOT ENOUGH . . .

"It must not be taken for granted," writes a prominent Water Works General Superintendent and Chief Engineer, "that with the installation of meters all troubles come to an end. Meters must be properly maintained . . . Many a water company has become careless in meter maintenance, and as meter efficiency decreased, has looked to increased rates . . . A properly maintained meter department is the most important part of any water system." Trident Meters, simple, and rugged with 100% interchangeability of parts, are easy and economical to maintain, at "new meter accuracy" through years of constant service.

NEPTUNE METER COMPANY • 50 West 50th Street • NEW YORK 20, N.Y.
Branch Offices in Chicago, San Francisco, Los Angeles, Portland, Ore., Denver, Dallas, Kansas City, Louisville, Atlanta, Boston.
NEPTUNE METERS, LTD., Long Branch, Ont., Canada

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WATER & SEWAGE WORKS

Vol. 97, No. 7 **JULY, 1950**

A Gillette Publication

PHILADELPHIA AWWA CONVENTION ANOTHER RECORD BREAKER

2007 Registered for 70th Annual Meeting May 21-26

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Head, Chem. Dept.
Univ. of Florida
Gainesville, Fla.

Incoming President
W. Victor Weir
President
St. Louis Water Co.
St. Louis, Mo.

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New York City

Officers of The American Water Works Assn.

LAST year when writing about the Chicago Convention of AWWA, the theme of this piece was "the world's largest of everything". This year, in spite of dire predictions made in some quarters at that time, the Philadelphia Convention of AWWA broke last year's record attendance by a goodly number; 40 to be exact, for a total registration of 2007.

With an advance hotel registration of 2083, it was expected that this would be a record breaker. Six hundred and sixteen of these attendees registered on Sunday, with the exhibits opening that day at one p.m. By Monday evening registration had jumped to 1595. Then came a disappointing Tuesday when the count climbed only to 1790 and the record of last year seemed likely to stand. Wednesday, however, hit 1915 and Thursday by closing time at the registration desk there had been a grand total of 2007 persons step up and pay the registration fee. Of these, 329 were ladies. That's less than last year at Chicago by 45, which means that 85 more men attended this year.

So much for the statistics. This year, the registration was handled by the Philadelphia Convention Hall staff, under the direction of "Rick" Johnson (Asst. Secy. AWWA) and "Dan" Fischel (Asst. Edit. AWWA Jour.). Other members of the AWWA headquarters staff besides Harry Jordan who helped make the meeting a success were Mrs. Lois Schultz who handled the information booth, and Miss Mary C. Rodgers who acted as Secretary in the temporary AWWA office in Philadelphia.

An innovation of registration this year was the freedom with which a registrant could pick his own badge or lapel label. Three colors of cards were available: Buff cards for active members; green cards for members attending their first AWWA Convention, and gray cards for manufacturers representatives. For what it is worth, this reporter's observations failed to find very many green cards, which may mean that few newcomers attend conventions or it may mean that the "freshman" didn't want to give the fact away.

Hosts for the convention were the members of the Pennsylvania Section of AWWA. This committee, much in evidence around the registration desk, was chairmaned by Austin Meehan, of John Meehan & Son, Water Pipe Construction, Philadelphia.

J. J. Hinman, Jr.
Cons. Engr.
Iowa City, Iowa

New Honorary Members
J. H. Murdoch, Jr.
Vice Pres.
Amer. W. W. Co.
New York City

Geo. W. Pracy
Gen. Mgr.
Water Dept.
San Francisco, Cal.

Convention Committee Chairmen

Chas. H. Capen
Ch. Engr.
No. Jr. Wat. Comm.
Wanaque, N.J.
(Program)

E. A. Sigworth
Technical Sales
"Nuchar"
New York City
(Conv. Management
Transportation)

F. S. Friel
Cons. Engr.
Philadelphia
Penna.
(Publicity)

T. T. Quigley
Adv. Mgr.
Wallace & Tiernan
Newark, N.J.
(Entertainment)

In spite of the fact that the exhibits and the convention sessions were held in Convention Hall, which is some distance from even the nearest hotel, the attendance at the exhibit hall was considered quite satisfactory from the point of view of the 91 exhibitors. This year's exhibits topped the previous year with three more exhibitors, 13 more booths (145) and 675 more sq. ft. of exhibit space (14,500). The exhibits were in charge of Miss Dorothy E. Dimmers, Act. Secy.-Mgr., Water & Sewage Works Manufacturers Assn.

Fifteen technical sessions were held covering the three divisions. More than 20 AWWA official committees held sessions and the Board of Directors had three meetings instead of the usual two. All in all, it was a busy week for official delegates.

Newspapers and radio took cognizance of the meeting. "Bill" Henry, newscaster for the Johns-Manville Corp. gave a tribute to members of the association on his May 24th newscast. Local stations in New York carried "news" reports of the meeting, and one quoted Harry Jordan, but called him the Eastern Delegate. A local columnist in a Philadelphia paper also commented on the meeting but let his zeal for his interest in the local ozonation plant carry away his better judgement to the extent that his column carried two very serious misstatements of fact.

Entertainment

Entertainment this year as usual took two forms: scheduled and unscheduled. The former was under the general chairmanship of "Tom" Quigley, Adv. Mgr., Wallace and Tiernan Co., Newark, N.J., and the latter was in the hands of many manufacturers' representatives as well as the conventioneers themselves.

For the ladies, there were tables of bridge and canasta ready at all times during the week in the Rendezvous Room of the Bellevue-Stratford. On Monday afternoon there occurred a reception and tea; on Tuesday a luncheon and fashion show, and on Wednesday there was a tour of Philadelphia's historic countryside including Independence Hall and Valley Forge.

In addition for the ladies, and the men as well, there was the Movie-Mixer at which movies of previous conventions were shown again, then the President's Reception and Dance, the Pretzel Panorama when Howard Lanin presented the "Gaslight Players" in Orphan Nell or the "Tale of the Moth and the Flame". Peanuts and pretzels with beer were popular that evening. So enthusiastic did the audience become at "hissing the villain" that they began to throw peanuts and pretzels at the stage. The players collected a bushel or more and after the play threw them back at the audience, which richly deserved the treatment.

On Award Night (Wednesday) the Philadelphia Chapter of the Society for the Preservation and Encouragement of Barber Shop Quartet Singing in America, Inc. kept the audience happy with a delightful program interspersed with awards and some real barber shop quartet singing by the Keystone Four.

At the annual dinner, entertainment was furnished by the Rockwell Chorus from Pittsburgh and by George Haggerty (that minstrel man) and Buddy Hearn, guitarist extraordinary, both of the W & T organization.

Unscheduled entertainment included, besides room hopping, and eating at some of Philadelphia's famous restaurants, such diverse items as a picnic by the Wisconsin delegation, a breakfast by the New York Section, and a bridge tournament that ran all week on the 14th floor of the B-S hotel. (You can read more about it elsewhere in this issue).

AWWA'S Officers

At the close of the banquet on Thursday evening, presided over by retiring president Dr. A. P. Black, Head, Chem. Dept., University of Florida, Gainesville, Fla. The new officers were presented.

President
W. Victor Weir, Pres.,
St. Louis County Water Co.
St. Louis, Mo.

Vice President
Dr. A. E. Berry, Director
Div. of San. Engng.
Ministry of Health
Province of Ontario
Toronto, Ont.

Treasurer
W. W. Brush, Editor
Water Works Engineering
New York City

Exec. Secretary
Harry E. Jordan
New York City

Honorary Memberships

Three members were presented honorary memberships:

JACK J. HINMAN, JR., Engineer, Iowa City, Iowa; a member of the association since 1915, president of the Association in 1930, Director of the Iowa Sect. 1919-21 and Secy.-Treas. of the Iowa Sect. 1916-27.

JOHN H. MURDOCH, JR., Vice Pres. and Counsel, Water Service Co. of New York, N.Y.; a member of

Convention Committee Chairmen

F. P. McDonald
Mgr. Cath. Prot. Sales
Electro Rust Proofing
Chicago, Ill.
(Pretzel Panorama)

W. A. Welch
Sales Engr.
"Nuchar"
Philadelphia, Pa.
(Movie-Mixer)

E. J. Taylor
Chief
Bur. of Water
Philadelphia, Pa.
(Pres. Reception)

L. S. Morgan
Div. Engr.
Pa. H'lth Dept.
Greensburgh, Pa.
(First Timers)

the Association since 1930 and outstanding contributor to the advancement of the water supply industry.

GEORGE W. PRACY, Gen. Mgr. and Chief Engineer, San Francisco Water Dept.; a member of the Association since 1915; President of the Association in 1933, Fuller Awardee 1944, and Secy-Treas., Trustee, Vice Chair., and Chairman of the Calif. Sect. at various times.

AWWA Awards

Diven Medal
Jos. P. Schwada
Engineer
Civ. Def.
Milwaukee, Wis.

Goodell Prize to the Fluoridation Policy Committee

L. H. Enslow
Editor
Wat. & Sew. Wks.
New York City

H. A. Faber
Res. Chem.
Chlorine Inst.
New YorkCity

R. J. Faust
Chief, Div. Wat.
Mich. Dept. H'lth
Lansing, Mich.

(Other members of committee, pictured elsewhere, were Dr. A. P. Black, Chairman, A. E. Berry, W. V. Weir and Dr. H. T. Dean)

Award Night

In addition to the honorary memberships, two other prizes and the Fuller Awards were made at the Award Night Session. The DIVEN MEDAL for 1949 was awarded to *JOSEPH P. SCHWADA* "in recognition of the effort expended in directing a committee in the preparation of Revised Specifications for Laying Cast Iron Water Mains and for his meticulous care, exacting detail, and frank and courageous presentation of the problems involved."

The GOODELL PRIZE for 1949 was awarded to a committee composed of A. P. Black, Chairman, A. E. Berry, L. H. Enslow, H. A. Faber, R. J. Faust, W. V. Weir, and H. T. Dean, on "The Fluoridation of Public Water Supplies—Statement of Recommended Policy and Procedure" which was presented at the 1949 Annual Conference of the Association in Chicago.

The selection of an Association committee to receive the Goodell Prize was unusual, but was considered a perfectly proper act. The committee report had received wide recognition among people in the public health field and in the dental profession. It represents an important step in Association policy.

Twenty-four GEORGE WARREN FULLER AWARDS were made for 1950. Many of the awardees were present to receive the certificates in person. Alphabetically by sections the awards were as follows: Herbert Andrew Kroeze (Alabama-Mississippi), Helen Cowden Rotthaus (Arizona), James Ryerson Barker (California), Alexander Brock Manson (Canadian), Edward Scott Hopkins (Chesapeake), William Asa Glass (Florida), Lewis I. Birdsall (Illinois), John Lawrence Ford (Indiana), Frank Alden Russell (Kansas), Frank Clark Dugan (Kentucky-Tennessee), Louis Evans Ayres (Michigan), Warren Alvin Kramer (Missouri), Joseph Micheal Schmit (Montana), John Connett Detweiler (Nebraska), Gordon Maskew Fair (New England), James Ernest Garratt (New Jersey), James McClure Wardle (New York), Wallace Wilber Morehouse (Ohio), Thomas Henry Judd (Pacific Northwest), Howard Eugene Moses (Pennsylvania), Hugh Allen Wyckoff (Southeastern), Albert Rosen Davis (Southwest), Howard Edward Lordley (Virginia), Harold Leo Londo (Wisconsin). Six sections made no awards.

At the Award Night, Hack J. Hinman, Jr. presented *EIKICHI IWASAKI*, Chief of Water Supply Section, Bureau of Water Works, Tokyo Metropolitan Government, Japan, who read a letter from the Tokyo government bringing greetings to the American Water Works Assn.

Cup Winners

The HENSHAW CUP award for 1949 was presented to the Arizona Section as the section with the highest percentage of membership attending an annual meeting of the section. The Arizona Section won with 72.5 per cent. The Montana Section was second with 64 per cent and the Cuban Section third with 61.4 per cent.

The HILL CUP for membership growth was also awarded to the Arizona Section with a point score of 393.9. The Chesapeake Section was second with a point score of 66.6 and the Kentucky-Tennessee Section was third with a point score of 47.4. Last year the Ky.-Tenn. section was runner-up. (This is the first time the award of the Hill Cup has been made on the calendar year basis; prior awards have been made on inter-convention competition period.

In spite of the fact that the Board of Directors had agreed that the OLD OAKEN BUCKET (emblematic of the largest section) would be permanently retired to the California Section until such time as another section could win it, the California Section stated that they would continue to bring it to each convention and to receive it as long as they are entitled to it. Runners-up in membership are the New York Section and the Southwest Section.

Presidential Addresses

At the annual banquet, the retiring President Black and incoming President "Vic" Weir both spoke with particular reference to increasing membership. Dr. Black's Swan Song called attention to the ratio of members to potential membership and pointed out that the membership had doubled in the past decade and could double again in the next ten years if all sections reached the ratio now existing in the California Section.

Mr. Weir called for development of interest in the water works profession among young engineers. There is a definite need for inducing young men to enter the profession and to enroll these men in the Association.

W & S Wks. Mfrs. Assn. Officers

President
R. F. Hayes
Vice Pres.
Hydraulic Dev. Corp.
New York City

Pres. Elect
R. F. Orth
Mgr. "Transite"
Johns-Manville
New York City

Vice Pres. Elect
E. M. Jones
V. P. & Gen. Mgr.
Simplex Valve
Philadelphia

Act. Secy. Mgr.
D. E. Dimmers
Act. Secy. Mgr.
WSWMA
New York City

W. G. Banks
Div. Engr.
Div. of Water
Newark, N.J.
(New Jersey)

A. N. Beck
Chief Engr.
Ala. H'lth Dept.
Montgomery, Ala.
(Ala.-Miss.)

J. A. Carollo
Cons. Engr.
Ferguson & Carollo
Phoenix, Ariz.
(Arizona)

New AWWA Directors

E. H. Ellis
Hyd. Engr.
Factory Mutual
Boston, Mass.
(New England)

R. Newsom
Village Mgr.
Scarsdale
New York
(New York)

(Other Directors shown elsewhere—R. J. Faust, F. Merryfield, E. J. Taylor and Ray Case)

Photographic Contest

Prizes were awarded for photographs submitted in four classes as follows:

CONSTRUCTION CLASS: Group of photographs showing pipe line construction, submitted by L. J. Shelton, Gen. Mgr. and Chief Engr., La Mesa, Lemon Grove and Spring Valley Irrigation District, La Mesa, Calif.

OPERATION CLASS: Group of photographs showing "Before and After" effect of Meter Room Improvements at Waterbury, Conn., submitted by Julius A. Nido, Supt. of Water, Dept. of Pub. Wks., Waterbury, Conn.

GENERAL INTEREST CLASS: Aerial Views of the Hialeah Water Plant, submitted by C. R. Henry, City of Miami, Fla.

PHOTO-MICROGRAPHS: Group submitted by George Turre, San. Engr., Bd. of Water Commissioners, Denver, Colo.

Honorable mention for the four groups went to Ivan V. Fosheim, Pontiac, Mich.; Dewey W. Johnson, Chicago, Ill., H. R. Frye, Evanston, Ill., and Paul P. Merkel, Reading, Penna.

Honorable Mention also went to P. S. Wilson, Glen Ridge, N.J. for 35 mm. Kodachrome slides: "Brass Oilers" and to Romig A. Papp, Princeton Junction, N.J., for the spectacular shots of the blowing up of the Mohne Dam (Ruhr Valley).

AWWA Division Officers

As is customary, all three divisions of the AWWA elected officers for the coming year.

WATER PURIFICATION DIVISION

Chairman—H. E. Lordley, Asst. Dir. Pub. Works, Richmond, Va.

Vice Chairman—H. O. Hartung, Plant Engr., St. Louis County Water Co., St. Louis, Mo.

Secy.-Treas.—R. L. Derby, Prin. San. Engr., Dept. Water & Power, Los Angeles, Calif.

Directors—Martin E. Flentje, Res. Engr., Amer. Water Works Co., New York City; W. W. Aultman, Water Purif. Engr., Metro. Water Dist. of So. Calif., LaVerne, Calif.

WATER RESOURCES DIVISION

Chairman—H. E. Hudson, Jr., Chief Engr., Ill. State Water Survey, Urbana, Ill.

Vice Chairman—Richard Hazen, Partner, Malcolm Pirnie Engrs., New York City.

Secy.-Treas.—Geo. E. Ferguson, Staff Officer, Water Resources Branch, U.S. Geol. Survey, Washington, D.C.

Directors—Dale Maffitt, Gen. Mgr., Water Works, Des Moines, Iowa; Fred Merryfield, Prof. San. Engng., Oregon State College, Corvallis, Ore.

WATER WORKS MANAGEMENT DIVISION

Chairman—L. J. Hoffman, Office Mgr., Water Div., Bur. of Water & Sewerage, Akron, Ohio.

Vice Chairman—Paul Weir, Gen. Mgr., Water Dept., Atlanta, Ga.

Secy.-Treas.—J. L. Hawkins, Supt., Water Works, Greenville, S. C.

Directors—M. B. Cunningham, Supt. & Engr., Water Dept., Oklahoma City, Okla.; James W. Myers, Vice Pres., Philadelphia Suburban Water Co., Bryn Mawr, Pa.

W&SWMA Meeting

The annual meeting of the Water & Sewage Works Manufacturers Assn. was held on Wednesday noon at the Union League Club in Philadelphia. Preceded by cocktails and followed by a speaker, a movie and an election of new members of the board, the meeting occupied the better part of the afternoon. During the first course of the luncheon, a strolling accordionist singled out Le Roy Evans of the Mueller Co. and Fred Merryfield of the Univ. of Oregon to sing solos.

Speaker of the day was *ALFRED H. WILLIAMS*, Pres., Federal Reserve Bank, of Philadelphia. Mr. Williams spoke on "Business Leadership—Some New Requirements." It was a highly enlightening talk about the trends of business management since the beginning of the country and the need for developing human relationships in the future.

Following the speaker, a movie short "What Price Government?" was presented. This motion picture was made by the Citizens Committee

AWWA Directors

B. E. Payne
Chief Engr.
Water Co.
Louisville, Ky.
(Ky.-Tenn.)

W. C. Sherwood
Secy.
Hersey Mfg. Co.
Boston, Mass.
(W & SWMA)

AWWA Comm. Reports

W. R. LaDue
Gen. Mgr.
Wat. & Sew. Wks.
Akron, Ohio
(W. W. Administration)

L. R. Howson
Cons. Engr.
Chicago, Ill.
(W. W. Practice)

Officers of Water Works Management Division

L. J. Hoffman
Off. Mgr.
Div. of Water
Akron, Ohio

Paul Weir
Gen. Mgr.
Water Dept.
Atlanta, Ga.

J. L. Hawkins
Supt.
Water Works
Greenville, S.C.

M. B. Cunningham
Supt.
Water Dept.
Oklahoma City, Okla.

J. W. Myers
Vice Pres.
Phil. Sub. Wat. Co.
Bryn Mawr, Pa.

for the Hoover Report and it shows dramatically and forcefully the governmental waste discovered by the Hoover Commission.

New Board Members elected to serve included the following: Ford Meter Box Co., Wabash, Ind.; Neptune Meter Co., New York City; Pittsburgh Equitable Meter Co., Pittsburgh, Pa.; Pacific Flush Tank Co., Chicago, Ill. and Ross Valve Co., Troy, N.Y.

At the meeting of the WSWMA Bd. of Directors which followed, these officers were elected to serve terms beginning Jan. 1, 1950.

President—Robt. F. Orth, Mgr. "Transite" Pipe Div., Johns-Manville Corp., New York City.

Vice President—E. M. Jones, Vice Pres. & Gen. Mgr., Simplex Valve & Meter Co., Philadelphia, Pa.

Treasurer—E. J. Buttenheim, Pres., *American City Magazine*, New York City.

Act. Secy.-Mgr.—Miss Dorothy E. Dimmers, New York City.

During the luncheon meeting, a note of sadness was injected with the announcement that Arthur Clark, Secy. Mgr. of the WSWMA for many years was critically ill. (Later that night, Mr. Clark died)

Inspection Trips

Two very interesting inspection trips were available during the convention. One of these trips was a special bus tour to the new dam and filter plant of the Chester Municipal Authority. The filter plant (18mgd.) is located at Pine Grove, Pa. The new dam features tainter gates and side hill spillway. En route back from the installation, the tour stopped at Kennett Square to observe manufacture of 48-in. prestressed concrete pipe in the plant of the Lock Joint Pipe Co.

The other inspection trip was available twice daily and included the three water plants of the City of Philadelphia: Queens Lane where the laboratories are located and new treatment basins are under construction; the Torresdale plant, where a new pumping plant was on display; and the Belmont plant where the new ozonation equipment was the feature attraction. In addition to the scheduled bus trips to this plant, the Welsbach Corp. of Philadelphia gave free transportation by taxi to any one desiring to visit the Belmont plant. More than 250 persons visited Belmont to inspect the new installation and representatives of the company gave guided tours through the ozonation plant.

Water Works Adm. Comm.

At the first Open Session, *WENDELL R. LA DUE*, Chief Engr. & Supt., Bur. of Water & Sewerage, Akron, Ohio and Chairman of the Water Works Administration Committee, presented a brief report on the activities of that committee. Mr. La Due listed the committees which are active under that general committee and called attention to the fact that interest in water works administration is growing as witnessed by the fact that in 1948 there were only five papers in that field listed on the program of the convention that year. In 1949 there were 13 papers on water works administration and in 1950 the program at Philadelphia carried 19 papers or 40 per cent of the whole program.

Among the active committees are these: Mobile Radio, Air Conditioning, Fire Protection, Personnel, Pension and Retirement Funds, Water Main Extensions, Water Rates, and Taxes and Diversion of Funds. Mr. La Due called attention to the need for a new committee on Personnel Safety.

In the discussion which followed this introduction, *L. R. HOWSON* Cons. Engr., Chicago explained that in some states now the structural requirements are becoming a little severe in an attempt to provide for personnel safety.

G. E. ARNOLD, Dir., Water Dept., San Diego, Calif., stated that in his city, there is a definite safety program, under the supervision of a full time safety director. Once each month this director holds meetings with employees and twice each month he meets with foremen. The program is sponsored by the city government and is available to all departments of the city. It has definitely reduced the accident rate.

ARTHUR KURANZ, Mgr. Water Utility, Waukesha, Wis., said that in his state, both the Public Service Commission and the Insurance Companies were "on the neck" of the water utilities to keep accidents down.

Mr. La Due next called on *FRANK AMSBARY*, Vice Pres. & Secy., Illinois Water Service Co., Champaign, Ill. and Chairman of the Committee on Air Conditioning. Mr.

Purif. Div. Directors

M. E. Flentje
Res. Engr.
Am. W. Work Co.
New York City

W. W. Aultman
Purif. Engr.
So. Cal. Wat. Dist.
La Verne, Cal.

Wat. Res. Div. Directors

Dale Maffitt
Gen. Mgr.
Water Works
Des Moines, Iowa

F. Merryfield
Prof. San. Engr.
Ore. State Coll.
Corvalis, Ore.

Officers Purification Division

H. E. Lordley
Asst. Dir.
Pub. Works Dept.
Richmond, Va.
(Chairman)

H. O. Hartung
Plant Engr.
St. Louis Co. Wat. Co.
St. Louis, Mo.
(Vice Chair.)

R. L. Derby
Prin. San. Engr.
Wat. & Power Dept.
Los Angeles, Cal.
(Secy.-Treas.)

H. E. Hudson
Ch. Engr.
Water Survey
Urbana, Ill.
(Chairman)

Officers Water Resources Div.

R. Hazen
Cons. Engr.
New York
N.Y.
(Vice Chairman)

G. E. Ferguson
Staff Off.
U.S. Geol. Surv.
Washington, D.C.
(Secy.-Treas.)

Amsbary called attention to the need for changing the name of his committee to read "Committee on Use of Water in Air Conditioning and Other Refrigeration" inasmuch as it had been found that "other refrigeration" is quite important. The committee chairman believes that charges for water should be on a demand basis.

L. J. HOFFMAN, Office Mgr., Water Div., Akron, Ohio stated that in his city, there was a high connected load for air conditioning. Sixty per cent of the load is in the downtown area and the other 40 per cent is scattered. Installations of greater than ten ton capacity must have water conservation units. Water consumption for air conditioning is approximately 6 mgd. or about 20 per cent of an average day, but it comes on the peak days.

On the subject of Pensions and Retirement Plans, *DALE MAFFITT*, Gen. Mgr., Water Works, Des Moines, Iowa, said that any plan must be actuarilly sound. Public plans must be made to match industry plans. Hospitalization plans must be included. New Social Security legislation will affect some plans. Municipal plans must count on employee participation.

A. P. KURANZ, Waukesha, Wis. said it was important not to exclude the use of private insurance companies in setting up retirement plans.

Water Works Practice Committee

In opening that part of the session devoted to the Water Works Practice Committee, *LOUIS R. HOWSON*, Cons. Engr., Chicago, Ill., and Chairman of this Committee, said that it was the purpose of the committee to find out what happens as practice and designs change. Specifications must be brought up to date and the attempt made to keep up with actual practice.

Mr. Howson asked for comment from the floor on whether or not the AWWA Specifications on Pipe Laying are being followed. St. Paul is following the specifications. Champaign, Ill. uses rubber for backing up joints. Des Moines uses Fibrex and cement joints. Another city uses rubber backed by jute.

On the matter of joint packing, Mr. Howson stated that the Board of Directors had authorized an appropriation to investigate jute sterilization. *LEO LOUIS*, Supt. Water Dept.,

First Family
Marion, "Vic" and Joan Weir
(After Installation of "Vic" Weir as AWWA President.)

Cedar Rapids, Iowa stated that quaternary ammonium compounds had been found effective for jute sterilization but left the jute not too workable. *M. B. CUNNINGHAM*, Oklahoma City, Okla., reported the use of lime soaking for 24 hours. Thereafter the yarn is packed in hydrated lime. The water has a PH of 10.2. Using a wetting agent aids in the penetration of the lime. This wetting agent is known under the trade name of "Septigard".

J. ALLEN, Asst. Supt., Seattle, Wash., reported that some company had furnished Seattle with steam sterilized jute which was quite satisfactory, but he was unable to learn the name of the company from which the jute was obtained.

The Service Line Committee under *WALTER PIERCE*, Racine, Wis., is surveying the field in cities over 25,000 and hopes to develop a standard practice. The water softening committee under *H. O. HARTUNG*, St. Louis is working on contact settling basins.

On the matter of cement lining of pipe in place, *H. A. PRICE*, Spec. Engr., Dept. Water & Power, Los Angeles, Calif., reported that it had been found less expensive to install new cast iron pipe and line it in place than to install cement lined pipe. *W. R. LA DUE*, Akron, Ohio reported that great success was obtained in lining steel pipe with cement mortar in place. The original pipe was severely pitted and was leaking badly. Since lining, no leaks have occurred, and the pumping head has been reduced by 10 ft. In 1937, 65,000 ft. were lined and there has been no loss in head since. In 1943, 45,000 ft. more were lined. The "C" value on this pipe, based on actual diameter, is 128.

The Committee on Asbestos-Cement Pipe is surveying experience in the field and will present a report in the future. The Elevated Tank and Standpipe Committee has an eleven page agenda developed for the improvement of specifications.

(In the following issue, reports will be made on the other technical sessions of the Convention)

Honors Galore—
Helen Cowden Rotthaus, Secy. of the Arizona Section, was first woman Fuller Awardee and here holds Hill and Henshaw Cups won by her section.

BOLD TRIPLE CHLORINATION NOW STANDARD PRACTICE AT OTTUMWA

Super and Dechlorination, With Sulfur Dioxide Ahead of Filters; Carbon Contact Beds and Final Chloramine Treatment Provides "Complete" Treatment at Ottumwa, Iowa.

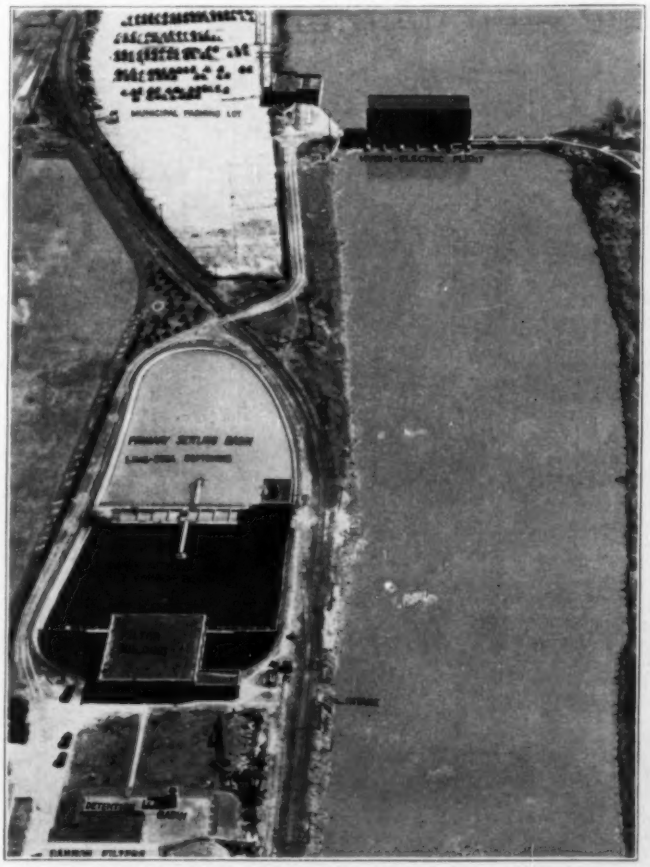
by

HORACE A. BROWN
Superintendent*
OTTUMWA WATER WORKS
OTTUMWA, IOWA

MANY readers of "Water & Sewage Works," particularly those who read the issue of April 1940 (then "Water Works and Sewerage") may be wondering what our epic emergency experience with "Super-Super Chlorination" finally led to here at the Ottumwa Water Plant. On this account I will outline our current chlorination practice and the results that we are regularly obtaining from it. The present practice of chlorination treatment, termed "Triple Chlorination," is the outgrowth of our experiences of 1940, and for many months now has been in successful daily usage at the Ottumwa Water Purification Plant. Therefore, I feel that the methods and results can be told without fear of having to retract any part of this account.

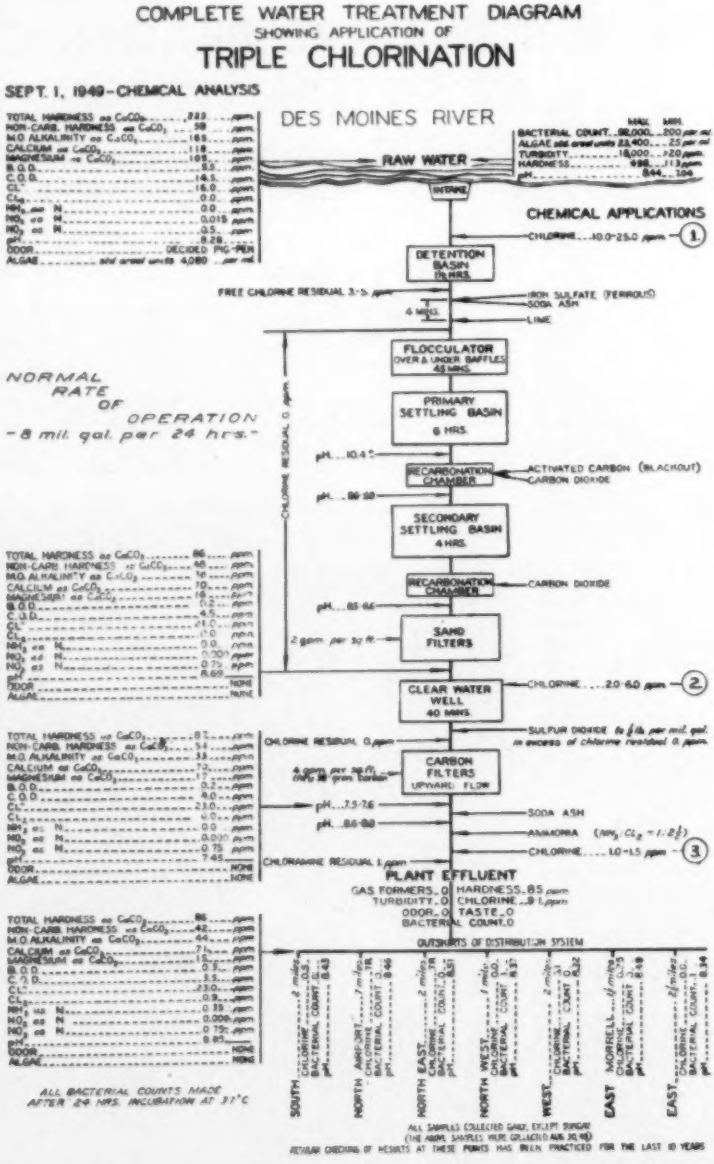
Readers of this article should bear in mind that the writer is not a chemist, but is only a run-of-the-mill engineer who has spent forty years of his life in the "Quest for Pure Water" and fighting the battles of water purification. It has long been my belief that we should not be content to merely clarify and sterilize the usually highly polluted surface water from which most of our cities are compelled to manufacture their water supply. While it has long been recognized that in matters of water supply "innocence is greatly to be preferred to repentance," we also must face the sad fact that sources of water supply that are entirely innocent of pollution are very scarce. Therefore, we who are charged with the responsibility of furnishing our communities with a good, wholesome, safe, water should exert every possible effort to bring about the highest degree of "repentance" and actually *purify* our water, and not content ourselves with simply clarifying and sterilizing it.

With this thought ever before us we have labored hard and long in Ottumwa, to bring about as high a degree of purification as is practically obtainable without prohibitive expense. So, profiting from our experi-



Water Treatment Plant of Ottumwa, Ia. on the Des Moines River

* Retired May 1, 1950.



THIS DIAGRAM SHOWS TREATMENT METHOD NOW IN USE AT OTTUMWA, IOWA GIVING THE CHARACTER OF THE RAW WATER, THE RESULTS AT INTERMEDIATE STEPS, AND THE QUALITY OF WATER BEING DELIVERED TO THE CONSUMERS.

Horace A. Brown

OTTUMWA WATER WORKS
OTTUMWA, IOWA

DRAWN BY M.S.

Flow Sheet and Treatment Diagram—Ottumwa's Water Purification Plant

ence of early 1940, we have carefully developed the following process, which we have named "Triple Chlorination". The several steps in the process are graphically shown on the accompanying flow diagram along with the characteristics of the water at various stages of the treatment given.

Super-Prechlorination

Our routine operation is, first to test the raw water before starting the plant in operation to determine its chlorine demand. We then set the raw water chlorinators to feed about 6 parts per million in excess of the indicated demand. The super-chlorinated raw water is delivered by pumps into a covered concrete basin, which was the former settling basin of our original filter plant built in 1911 and outgrown in 1933. This basin provides a detention (contact) period of about 1.5 hours, in which the chlorine can oxidize or otherwise attack the organic matter in the raw water before other chemicals are added. This chlorination is shown on our "Complete Treatment Diagram" at [1]. The total chlorine dosage in the entering raw water usually runs from 10 to 25 parts per million. The residual "free" chlorine at the end of this detention basin usually runs from 3 to 5 parts per million, although at times this will reach 6.0 to 6.5 parts per million. The bold application of chlorine at this point has been found to be of great value in reducing both taste and odor, very much as experienced in the 1940 emergency practice of extreme chlorination unheard of at the time.

At the outlet of this basin we add iron sulphate (ferrous sulphate) and soda ash to the chlorinated water, representing the first step in softening and coagulation. Lime is added just before the water enters the flocculator, some 4 minutes after leaving the first detention basin. The addition of these chemicals to the water (especially the ferrous iron) usually brings the free residual chlorine down to 1 part per million or under, as it enters the flocculator. This basin which we refer to as the "flocculator" is in reality an over and under baffled basin with a capacity of 45 minutes detention. Therein the chemical reactions cause a very complete floc which quickly settles out in the Primary Settling Basin beyond.

From the Primary Basin the water enters the first re-carbonation chamber wherein the pH is reduced to 9.6 or thereabouts. Leaving this chamber Aqua-Nuchar, (activated carbon), is added in sufficient quantities to produce a "Blackout" in the Secondary Settling Basin during hot bright days. This treatment effectively prevents algae from developing at this point. At the end of this Secondary Settling Basin, the water is given its final re-carbonation, bringing the pH down to 8.5 to 8.6, and it is then run through the sand filters.

The Author

Intermediate Over-Chlorination and Dechlorination

After filtration, we again set up a series of samples of the water and determine its chlorine demand. We have found the chlorine demand of the filter effluent to have quite a surprisingly wide range, usually between 2.0 and 6.0 p.p.m. Chlorine is added to the water entering the clear well (point [2] on the diagram) in amounts of 1 to 2 p.p.m. above the indicated laboratory demand. After about 40 minutes detention in the Clear Well, all residual chlorine is removed by the use of sulphur dioxide gas (SO_2) applied at the suction of the clear water pump. At present, we purchase SO_2 in 150 lb. cylinders. (We expect, soon, to use one ton containers.)

Extreme care must be taken with this de-chlorination to remove *every last trace* of chlorine. If this is not done, troublesome tastes develop from the later production of nitrogen chloride (NCl_3), which will persist throughout the remainder of the treatment and reach the consumer who quickly notifies the office of the bad water he is getting. Very few complaints, if any, have been received here in recent months, however, only one day of bad testing water per year will make the consumer quickly forget the other 364 days of good water.

Activated Carbon Contact Beds Final Line of Defense

As an additional safe-guard against tastes and odors, we have equipped the old filter shells of our outgrown sand filter plant with granular carbon contact beds. They are operated as upward flow units at a rate of 4 gallons per minute, per sq. ft. of bed area. We feel, however, that this rate is too great for the 36 inch bed of carbon. We have found that these filters at the 4 gal. rate will not remove tastes due to nitrogen chloride (NCl_3); therefore, we expect soon to provide for a slower rate of upward flow.

The alkalinity of the water is adjusted at this point by the addition of soda ash to maintain the pH of the final effluent between 8.6 and 8.8. This adjusted pH has reduced complaints of "Red Water" to the vanishing point, none having been received for a long time.

Final Chlorination and Ammoniation

The effluent from the carbon filters is then given a final treatment using anhydrous ammonia and chlorine so as to maintain a cloramine residual of 0.9 to 1.0 p.p.m. when leaving the plant. This final addititon of chlorine is shown at point [3] on the treatment diagram.

Results

For the past 10 years we have daily collected samples from 7 different points around the outskirts of our distribution system, and we now always find satisfactory results.

The accompanying diagram shows the character of the raw water and the results obtained at the intermediate steps in our purification process, the character of the water leaving our plant: and, most important of all, the kind of water actually received by the consumer.

We firmly believe, from our experiences, that water treatment by multiple chlorination (*if carefully planned and used,*) will solve the majority of all water purification problems. By this treatment the water-works operator can be most certain of being able to deliver to the consumer a clean tasting, pure, sparkling water. Our consumers now seem to be very well satisfied with Ottumwa's purified water.

Careful supervision must be maintained at all times to insure the success of this form of treatment, and a full time chemist with a well equipped laboratory and a capable assistant are kept on duty at all times when the purification plant is operating.

WHY, WATER-LEVEL RECORDERS?

A Comparison of Yesterday and Today in Water Level and Flow Recording.

by

J. C. STEVENS*
Consulting Engineer
PORTLAND, ORE.

"Stevens, you never could work unless you were in gold trimmed harness."

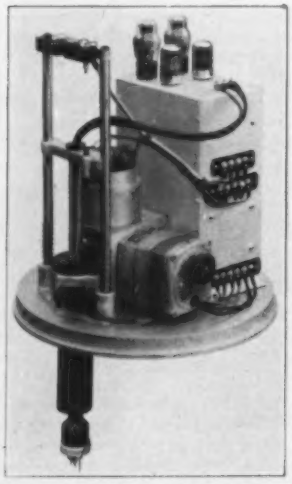
THAT was the essence of the laconic rejoinder I got from my boss, the Chief of the Water Resources Branch of the U. S. Geological Survey, in 1907, when I requested permission to buy a water level recorder for a gaging station on Tieton River in Washington. This was in 1907—and, *I didn't get the recorder!*

During snow melting time the Tieton is subject to great diurnal fluctuations, and its waters were about to be put to use irrigating one of the richest areas in the Northwest. The Tieton Project has since been completed, and has the distinction of being the first of all the reclamation projects of the Bureau of Reclamation to pay into the U. S. Treasury the entire reclamation costs assessed against it. Embracing 30,000 acres of rich orchard and general farming land in the Yakima Project, this division has been practically completed. Nearly 600,000 acres of land are now irrigated with waters from Yakima River and its tributaries. The area boasts 29 growing towns and the flourishing city of Yakima, with a population of over 100,000.

The annual crop returns from this project run into millions of dollars. Water level recorders were essential to its development and now play a vital part of the facilities for the storage and control of Yakima River waters that pass through six large reservoirs having a combined storage capacity of over a million acre feet, and finally reach the root zone of plants from which springs the wealth of this region.

The story of the Tieton and Yakima rivers may be repeated many times as symbolic of the development of the west, and the role played therein by the humble water stage recorder. It is the "gold trimming" on the harness that works these modern wonders.

*Stevens & Koon, Engineers; Treas. Leupold & Stevens, Inc., and Past President, Am. Soc. Civil Engrs.



Newest Development in L & S Water Level Recorders

Mechanism for Measuring Liquid Levels to Accuracy of 1/3,000ths Inch.

Gaging Methods of Yesterday

In my young engineering days the flow of streams was obtained by installing a staff gage in the bank or on a bridge pier or wall, and hiring a nearby resident to record and report the water stage daily. For this he was paid from $3.00 to $25.00 per month. A hydrographer would visit the station occasionally and make a current meter measurement of the discharge at varying stages. These discharge measurements were plotted against the corresponding gage readings for the purpose of developing a rating curve and table. Using this rating data, together with the daily gage readings reported by the local observer, the daily flows were theoretically determined—the dependability of which was so essential to the proper and economic planning and execution of all water utilization projects, be it for irrigation, power, sanitary, municipal or industrial purposes. One can imagine just about how accurate were the recorded daily discharges.

Although the discharge rates were calculated to an exact nicety, they were based on but a single gage reading on a stream, where the daily maximum might be 10 times the minimum. The obvious answer was the installation of an automatic water stage recorder. Many of these gaging stations are in isolated localities where there are no local residents that can be employed to record staff-gage readings.

In 1907 there were but few water stage recorders. The best that could be had were 8-day recorders which had to be visited weekly, the clock wound and the chart changed. My experience on the Tieton River, and of course many other streams similarly erratic, convinced me that reliable basic data so vital to the de-

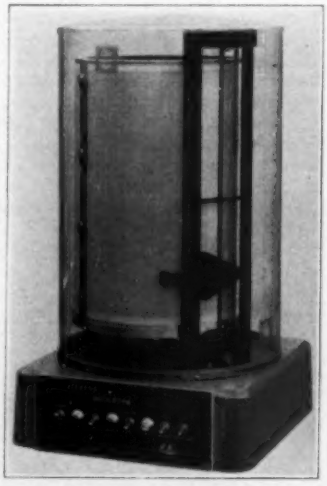


Chart Assembly for L & S Water Level Recorder

Continuous Graphic Record Appears on Strip Chart.

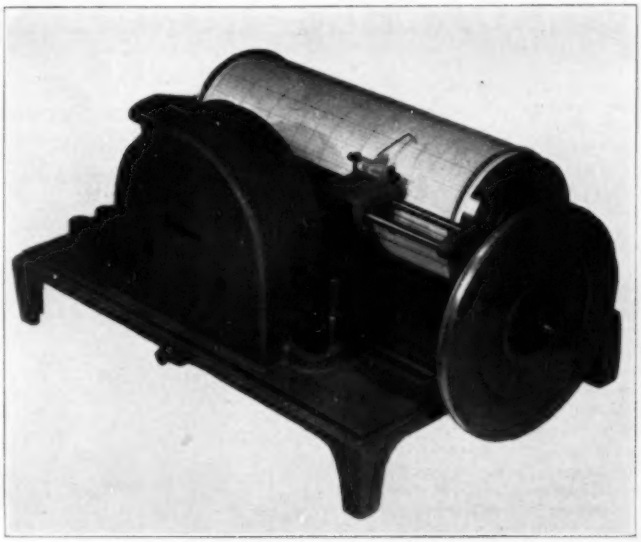
velopment of the water resources of the west could not be obtained unless a water level recorder could be produced to meet the varied field conditions—one that could be depended upon for one to six months, or even longer. Such a recorder would have to be reliable and foolproof, and contain a strip recording chart of sufficient length to register with a reasonable degree of accuracy to a legible scale all the fluctuations of the stream that occurred in the interval.

The local observers could then be dispensed with, and the field hydrographer himself could then service a large number of gaging stations. In consequence dependable data could be obtained—data having the necessary degree of accuracy, instead of the sloppy stuff for which I still shudder when I pick up a certain first decade Geological Survey Water Supply Paper, which bears my name as co-author.

And — Today

But what a change in a few years! *Everyone* having to do with stream flow nowadays "works in gold-trimmed harness." Neither the Geological Survey, the Bureau of Reclamation, Army Engineers, Indian Service, Forest Service, municipalities, power companies, irrigation districts, paper mills or other industries would think of establishing a gaging station on a stream without including an automatic water-stage recorder as a part of the equipment. Systematic registration of water levels enters so largely into the economical operation of streams and reservoirs for hydroelectric power, municipal water supplies, irrigation, flood control, sewerage, and industrial usage, that water level recorders, indicators and water control equipment are found on the switch boards and control panels of all such plants. And, not satisfied with transmission by electrical circuits, a new era is dawning wherein transmission and controls by radio are successfully employed and bid fair to supplant the present wire and pole systems.

We are also searching for practicable means of transmitting not only water levels, but precipitation, water and air temperatures, humidity and barometric readings as well as flow of water, oil, gas and chemicals in pipes. Precipitation recorders with air temperature pens, and water level recorders with water temperature attachments are already on the market. The transmission of flow of all kinds of fluids has long been accomplished.



Familiar Type F Stevens Recorder
Widely Used for Ordinary Recording of Liquid Levels Accurately on Strip Chart.

Temperatures, humidity and air pressures are daily transmitted by radio Sonde from balloons for weather forecasting and is just around the corner for use in the control of many types of hydraulic works.

In the waterworks field flows are generally measured in pipes. The old reliable Venturi meter is the standard device, but orifices, nozzles, even bends are being utilized. Almost any device that produces a stable drop in head may serve as an indicator of flow. The popular method of registration has been to balance the pressure in the conduit with columns of mercury in a pair of fairly large manometer tubes. Floats in the mercury serve to actuate differential devices that record, indicate and totalize flow. The accuracy of such registration has been greatly increased and velocities through the measuring devices have been materially reduced by the use of a pair of water manometer tubes joined together at the top and containing compressed air to retain the water columns within the compass of the tubes. A box like cabinet rides up and down on each tube suspended by differential gearing operated by a small reversible motor. Each cabinet contains a light and a photocel that actuate the motor to cause the cabinet to always remain poised at the water level in the respective manometer tube which it monitors. The differential device then actuates a device that records, indicates and totalizes flow. It may also control pumps, chemical feeders or other industrial equipment.

Measurement of Sewage Flow

The measurement of sewage flow is a difficult problem that is not always solved satisfactorily. Where the sewage can be passed over a weir, through a Parshall Flume or other type of open channel measuring device, the ordinary float operated recorder-indicator-totalizer serves most economically. But where the flow of sewage in pipes is required, special means of keeping the manometer tubes and connections from being choked with sewage solids must be adopted. This problem has been solved in connection with the use of the photocel and water manometer tube registering device indicated above. Clear distilled water is used in the manometer tubes. This clear does not come in contact with the sewage at all, yet the water levels in the tubes fluctuate differentially to accurately indicate the flow in the Venturi tube, orifice, nozzle or bend to which the manometer tubes are connected.

The hydraulic and sanitary engineer now has at his disposal all the gadgetry required to obtain reliable basic data for the construction and successful operation of all the varied kinds of hydraulic or sanitary development works in which his interest lies. The harness in which the engineer of today works is not only "gold-trimmed" — it is "diamond studded."

HEADACHES, HUNCHES AND HARD WORK

Pages from the Life of a Superintendent

(Third Installment)

by
M'KEAN MAFFITT
Retired Supt. of Water & Sewage Wks.
WILMINGTON, N.C.

WHEN the growth of our city demanded that certain improvements in the water supply be made pronto, bonds were issued and work was started. But, there were many hitches before the bugs were gotten out of the new plant. One of the items included in the new work was a stand pipe of some 750,000 gallons capacity along with the abandonment of the old smaller stand pipe, located in the heart of the city, to make room for a new and larger hotel.

Soon after the starting of the new plant we had a terrific blow-out in the pipe-pit of the new plant. The designing engineer, never having operated a plant, treated the whole thing from the designer's point of view and not from the operator's. The result was a very bad layout of mains, valves and cross connections between feeder mains. The first mistake made was placing cross connections between big feeder mains with only one valve in the connection. If one of these valves had become disarranged so that it had to be worked on, it would have been necessary to close down both feeder mains, thus eliminating the entire supply. We soon learned to close these valves and leave them closed, thus eliminating the sectional feeder system.

As these two mains, paralleling each other, approached the pumping station there was inserted in each of them a 20" horizontal stem, hand operated gate valve. The mains then ran into the station and were connected together at the far side of the line of pressure pumps. This connection was so made that, it was hoped, that either pump could pump into either force main leading to the city. Each pump had a double discharge effect, one discharge connecting to each feeder header. The headers were connected together with a breeches fitting so that in future the upper end of the breeches fitting could be extended for future extensions. But as luck would have it, the breeches fitting was too light for the job; and, as so often happens in complicated castings, there were defects in the fitting. It split.

The Author
Hon. Member A.W.W.A.

This is one of a series of "short-stories" by a Water Works Super, who claims that he learned all that he knows about the water works business "the hard way."

We have frequently listened with much pleasure to the philosophy and reasoning of the author, as expressed on the floor of water works meetings and privately. And, we have heard him "preach" a lot of common sense to the younger men and newcomers in the water works business.

We have admired his counselling and his long-time leadership in the North Carolina Section of A.W.W.A., of which he was a founder.

Opened up just like the covers to a ham sandwich, but there was no ham; also, no water in the city until we could start up the old pumping station, which luckily had not yet been abandoned. The Board of Water Commissioners would not approve the purchase of a valve to go into the line connection so that we could isolate one header from the other and use either alone. Strange to say, some years afterwards in another city I had the same condition to contend with. This time it was a single header with four pumps connected between the two valves, one at the south side of the building and the other at the north side. The designing engineer said that, since the pipe header was extra heavy flanged pipe, there was no danger of breakage; but, he evidently did not figure on all of the strains, because one morning at about 5:00 A.M. a flanged tee leading from the header to the discharge of the biggest pump we had let go. Within a few moments the entire city was without water. Our elevated storage amounted to only 142,000 gallons with everything full, so we shut that off and retained it for fire fighting—not that it would have done much good, but then we had to have some alibi in an effort to carry on.

In this last case I simply blanked off the 30" flanged pipe header with a ¾" thick steel plate and left the big pump idle until I could get a valve and insert it between the big pump and the three smaller ones, thus being enabled to pump into the north end of the header with the big pump, and into the south end of the header with the three smaller pumps. This, in effect, gave me two headers as should have been provided in the beginning.

Just a Damp Spot—but Then What?

Soon after we had finished the extensions mentioned above we began to transfer house connections from the old to the new mains, thus abandoning the old. In one case there was an old 4" C.I. main that had been paralleled with a new 20" C.I. main, the new main being laid almost directly under the old main. Along towards nightfall one afternoon we had a report of a small leak in the main. We investigated and found no running water, but a damp place in the macadam pavement immediately over the old 4" main and the new 20" main. We decided that the leak was likely from a joint in the 4" main, chargeable to settlement of the surrounding soil after refilling the excavation made for the 20" main. But, woe unto he who makes assumptions. It was not the 4" main, it was the new 20" main that was leaking. This main had been tested to 300 lbs. pressure and passed by the inspector some several months previously, so we thought that it could hardly be pipe trouble but was most likely a disturbed joint in the old main.

Along about midnight we had a fire alarm. As I watched the pressure gage in the valve house go up and up as the engineer speeded his pumps I noticed a peculiar waving effect on the

gage, then a sudden collapse. I soon had the information where the break was. The 20" main had split for a distance of some 9 ft. of the 12 ft. length of pipe. When, late the next afternoon we managed to get the split-length broken out with hand operated sledge hammers we found that there had been a very small crack in the 20" pipe spigot end, just sufficient to cause a seepage. But when the pressure was increased from 50 lbs. per sq. in., to 105 lbs. per sq. in., the whole thing let loose. The cracked portion of the pipe revealed a rusty line for about 9 inches and a clean, clear crack for about eight feet further.

The night we worked on this main is one during which we kept the whole neighborhood awake with the noise we made hammering on this heavy pipe with 20 lb. sledges. Since we had only five laborers on the job, and they had to work in 2 man shifts for 20 minutes, then rest for 40 minutes, I personally took over one of the sledges and wore the skin off my hands in the process.

A Pig in the Reservoir?

Not very long after we started the new plant we had a report that a pig had been drowned in the reservoir. Even though we knew that a small pig in a reservoir of some 40,000,000 gallons capacity would not do much harm, that in fact the "cooters" (turtles to you) would probably eat him before he managed to ripen, thus eliminating the soup effect, we also knew that the public would sit down to breakfast, eat sausages and eggs and raise merry H— about the pig in the reservoir. So, we made an unsuccessful all night hunt for the carcass. Then, much to our relief, just about daylight the next morning the owner of the pig came onto the scene and reported that the pig had come home sometime during the night, and all was well.

When we were cleaning up after the force account job of installing the spiral pipe line from the reservoir to the pumping station, I, being only a novice at construction, decided to ride the rear end of one of the 20 ft. lengths of pipe that was being carried into the stock pile. The road over which we had to haul this pipe was anything but a road. It was more of a rut, or trail. It ran along the side of a steep hill and in places was some 3 to 4 feet higher on the uphill side than the downhill side. When we started to go over one of these places the rear end of the wagon upon which we hauled the pipe looked as if it would turn over.

I Learn About Catapults

All may have been well with the world, except that at about the extreme point of tilting the rear wheel on the uphill side of the wagon had to run over a stump, a root or a protruding rock. In any case, this threw the rear end of the wagon over towards the valley side and as I had been sitting on the eight foot overhang end of the pipe I was catapulted into the valley. On my way to a successful landing I passed through a barbed wire fence and then made a skid landing on the surface of a rough outcropping of granite. My face has never recovered. Most of the skin on the right side was left on the granite, but even worse two of the barbs on the fence had played havoc with my clothes. It mattered not too much about the flesh wounds, they would heal up, but my shirt, undershirt and trousers were torn beyond repair. One barb caught me on my right shoulder front, and traversed the distance to my groin, leaving a jagged, bleeding cut some 18" long. Another barb caught me just below the left shoulder rear and made its mark clear to the turn of the buttocks. Had I been affected with steatopygia I would have had a terrible cut, but as it was I looked both front and rear as if some one desired to split a hog, and even though the cuts were not deep, they were rather painful and bled with much gusto.

About two years after the completion of the new plant the then Superintendent attended a New Orleans conference (so-called) of the A.W.W.A., then the Shrine meeting which followed. Then, when he came home he had to go to bed for a couple of weeks to recuperate from his conventioneering. Since he had leave of absence for only the A.W.W.A. conference he got in bad with the Commission and each and every member began to look for a reason to fire him. This could not last very long, so sometime about 1909 he was not reappointed and I was made Acting Superintendent. That was when, instead of obtaining the degree of B.S., I obtained by public acclamation the appellation "S.B." Then, after a year of struggling and hard work a new superintendent was appointed and I was put back as general foreman in charge of distribution.

And, a Water Famine

Either in 1910 or 1911, I forget which, we suffered a water famine. The creek from which we obtained our supply went entirely dry. The amount of water that was flowing into the reservoir was at one time calculated to be less than 20 gpm. It wasn't very long before the reservoir was down some 30" below the overflow and conditions were more than catastrophic. I reported several times on the condition, yet the Board refused to move. Finally after a more than pessimistic report one member of the Board, who had at one time been superintendent of the system before the city took over, promised that if the Board would not take action he would pray for rain. He did. It rained. I mean it rained; once. The creek flow increased, the reservoir filled to overflowing and water ran over the spillway for 39 minutes. I reported to the Board what had happened and said in my report that the good Lord had taken care of us for the once, but believed after that He was leaving it up to us to get water elsewhere. Again the Board refused to move and within a period of a few weeks we were pumping mud. It was taking more water to wash the filters than we were using in the city and we had to shut down. We allowed the pumps to run one hour in the morning and one hour in the evening. It so happened that this kept the mains in the lower section of the city full most of the time and under some pressure. Therefore, the people in the valleys had water most of the time, but the people on the high ground had water only two hours a day.

Acting under orders from City Council I was put in charge of getting water. My orders read, "Get water." I did, but one H— of a time I had in doing it. We bought a pressure filter from the City of Asheville, N. C., installed it in the lines leading to the city from a creek on the east side of town. The pressure filter split like a rotten orange when we turned the city pressure into it. The creek went dry and all our efforts on that side of the city were at naught.

There was a creek some three miles away at the nearest point to the plant, so we bought 3 miles of pipe, laid it on the surface to the creek, put in a pumping station, which by the way never pumped a drop. When we started to connect this creek it had a flow estimated at 750,000 gallons a day. When we connected the pumps it was dry. It would take 3 hours to get enough water into the suction well to keep the pumps going for ten minutes.

In Desperation—A Water Train

Then, I conceived the idea of hauling water by train from the Catawba river some 12 miles away. There was a sidetrack near the S. A. L. Ry., bridge over the river. We installed a

tank, built a pumping plant and started running two 12 car trains hauling water. We arranged an overhead feeder line from the tank with connections so that all 12 cars could be filled at once. At the plant we used sheet iron, roofing tin, or anything we could get with which to build a trough under the sidetrack cross ties so that all 12 cars could be dumped at once. This trough led to the sedimentation basins, but necessarily our treatment was ragged and more or less guess work, but we managed somehow. While one train was being filled at the river the other train was at the plant being emptied. Thus we ran a shuttle train for about 15 days. After we had the train schedules worked out and everything in working order we turned on the water for the full 24 hours a day, and I went to bed. For the previous 11 days I had not taken off my clothes. I slept in the shop department on a cot, had a telephone at my side and took first call on all incoming calls. We never had any accidents, nor fires. There was only one person who had to be hailed into the courts for wasting water during the entire time, and he was let off with a warning. We had no resultant epidemic of disease nor other such trouble.

After it was all over and the bills were in and paid it was found that I had spent $76,000.00 but I had gotten water. No questions were asked and no explanation was given. Then the oldest inhabitant who lived near the creek from which we obtained our water supply offered the information that he had known this creek to go dry several times in his life, but that since in making his investigation the engineer had not asked him his opinion he had not offered it.

Just before the close of the construction period of this new plant we had one of those inexplicable things that so often happen in public administration. I had left the city to go to college. But after 90 days my eyes failed and I had to retire from studies. When I left the university I was assigned to the position as time keeper on the construction work. Later I was moved up and made foreman. The man who took my place managed to pad the pay rolls and upon being discovered he made a public press statement that the department was some $50,000 short in funds. This was taken by the public and the Board to mean that the superintendent had misappropriated that amount. The entire Board went up in the air and ordered an investigation. Since the work was being done by force account, there was no contractor involved, so the superintendent and the consulting engineer were accused of larceny, along with the construction superintendent.

It happened that in the meetings of the Board during the investigation that the newspaper reporter had heard a question asked the superintendent by commissioner A, but the superintendent had heard the question asked by commissioner B. Therefore the newspaper reporter connected the superintendent's answer to question by B to the question by A. The result was a complete misunderstanding in every way. The newspapers made a mess of the thing and the public egged the Commission on and on. At first the superintendent endeavored to make things clear by himself, having no attorney present to see that the investigation was made in due order. It happened that one member of the Board was a prominent attorney, and he afterwards made the statement that he did not understand how he had allowed the thing to get so far out of hand. The Commission would not even allow the superintendent to refer to the records for his answers. It expected him to carry all these figures in his head, which was impossible. Finally he sent to Alabama and hired a lawyer, one Mr. Fitts. And brother, did he give that Commission fits. The first night he was present at the meeting he made the Board members acknowledge that there was no case, that the whole thing was a mistake and a misunderstanding. The pay roll clerk, who had raised his own pay, was made to refund the city the amount he had received, the superintendent resigned, then later killed himself in New York. The whole affair soon died down, but the death of the superintendent is still against the record of the Board if a record of such things is kept in the Great Beyond.

Clinton Decker Dies

A.W.W.A. Director and Diven Medalist

Asbury Clinton Decker, Sanitary Engr., Tenn. Coal, Iron & Ry. Co. died in a Birmingham, Ala., hospital on May 22nd, 1950 after a long illness. He was in his 64th year.

At the time om his death Mr. Decker was serving as Am. Water Works Assn. Director, representing the Alabama-Mississippi section. In 1948 he was awarded the Diven Medal by the Association for his work as Chairman of the Committee on Revision of the "Manual on Water Quality and Treatment." He had also served as Chairman of the Water Purification Division of A.W.W.A. in 1944.

Mr. Decker was born in Prince Bay, N.Y., July 28, 1886 and was a graduate of Cornell University in Civil Engineering, 1909. His first job was that of chemist and bacteriologist at the Little Falls, N.J., plant of the East Jersey Water Co.—the first rapid sand filtration plant of the gravity type built in the United States. In 1910 he moved to Birmingham, Ala., as Chemist and Bacteriologist for the Birmingham Water Co. and in 1912

Asbury Clinton Decker

joined the Tenn. Coal, Iron & Ry. Co. of Birmingham, as Sanitary Engineer and Chemist. This position he held for 38 years to the time of his death. For seven years (1932-1939) he served on the Commission which was responsible for the conception and execution of the Industrial Water Supply for Birmingham which was constructed as a relief project during the depression but which has proven financially sound and a great boom to the industries of Birmingham. Mr. Decker was one of the "spark-plug" members of the Commission and deserving of high praise for his part in this novel undertaking which has since been paralleled by similar cooperative industrial water supply undertakings. Mr. Decker also served as advisor and consultant to a number of small municipalities in Alabama and several subsidiaries of the U.S. Steel Corporation in matters pertaining to water supply and sewage disposal.

Mr. Decker was a member of a number of technical and professional societies including the Am. Public Health Assn. and the Am. Soc. of Civil Engrs., of which he had been Chairman of the Sanitary Engineering Division in 1944. He was a past-president of the Engineer's Club of Birmingham. As has already been related, he was a member of the Am. Water Works Assn. since 1915 and of which he was a Diven Medalist in 1948 and a member of its Board of Directors at the time of his death.

ILLINOIS SECTION 40TH MEETING

Held in Chicago in April

Chairmen

Outgoing	Incoming
J. C. Mooman	*W. R. Gelston*
Mgr.	*Supt.*
No. Ill. Wat. Co.	*Wat. Comm.*
Sterling, Ill.	*Quincy, Ill.*

MEETING in Chicago in April, the Illinois Section AWWA held its 40th annual convention. Although the convention was well attended it was not a record breaker. Those who did attend were well repaid with an interesting and enlightening program. Of particular interest was the public relations exhibit on display by Horace Frye, Supt., Evanston, Ill. This unique exhibit consists of a diagramatic sketch of the Evanston water plant with concealed lights which by means of clever wiring flash on in sequence at all of the points of operation shown on the diagram. As each light flashes the observer is able to follow the course of the water through the plant and to read the operation being performed at that point. The display has proved of inestimable value in its display before schools and various groups in Evanston.

New Officers

The following members were elected to serve the section as officers for the ensuing year:

Chairman
W. R. Gelston, Supt.
Water Works Commission
Quincy, Ill.

Vice Chairman
E. E. Alt, Sales Engr.
Chicago Bridge and Iron Co.
Chicago, Ill.

Senior Trustee
Oscar Gullans, Director
Filtration Laboratories
So. Dist. Filtration Plant
Chicago, Ill.

Junior Trustee
H. E. Hudson, Jr., Chief Engr.
Ill. State Water Survey
Urbana, Ill.

Secy.-Treas.
L. E. Hart, West. Sales Mgr.
U.S. Pipe & Fdry. Co.
Chicago, Ill.

The new chairman is the son of the late W. R. Gelston, former Supt. at Quincy, Ill. and a one time Chairman of the section. This is the second time in the history of the section that a son of a former chairman has also been elected chairman of the section.

The section paid tribute to the work of the retiring secretary, Carl N. Brown who resigned because of a transfer from the position of Western Sales Manager for the U.S. Pipe & Fdry. Co. in Chicago to the position of Asst. Sales Mgr. in the home office of the company in Burlington, N.J.

Fuller Award
Lewis I. Birdsall
General Chem. Co.
Chicago, Ill.

Fuller Award

The Fuller Award Committee of the Section announced its unanimous choice for the award with this citation: "To Lewis I. Birdsall for his thirty seven years of active membership, his services in the several offices of the section, and his continuous interest and cooperation in waterworks operation which has been of inestimable value to the profession."

Public Relations

"PUBLIC RELATIONS AT WORK" by Horace Frye, Supt. Water Dept., Evanston, Ill.

Mr. Frye explained how he had built the simple and inexpensive display which he exhibited at the meeting and he told how it was loaned out to businessmens clubs, to business establishments, and to schools. Frye also suggested the use of pie charts to show the income and outgo of money in the operation of a water department. By means of illustrated slides he was able to show how the wiring diagram was constructed and he concluded with the recommendation that water works men "try lights on their public."

Revenue Diversion

"A METHOD FOR KEEPING WATER DEPT. REVENUES FOR WATER DEPT. USES," by H. S. Merz, Supt., Water Dept., Rockford, Ill.

Mr. Merz explained how he had developed a new rate increase and tied it to *NO* diversion of funds. The rate was added to industrial and commercial accounts after it was shown that such an increase was justified. Hydrant rental and charges for drinking water fountains was also increased. In discussing the paper, *W. R. GELSTON*, Quincy read the principal provisions of an ordinance which set up rate schedules and a method of insuring that water works funds are not subject to diversion.

Fluoridation

"FLUORIDATION IN SHEBOYGAN AND WISCONSIN" by Jerome C. Zufelt, Supt., Bd. of Water Commissioners, Sheboygan, Wis.

Mr. Zufelt reviewed the history of fluoridation at Sheboygan since its inception on Feb. 26, 1946. In this city, fluoridation is a city health department project, with the water department merely being the instrument which carries out the experiment. Expenses are paid by the health department. The cost of adding fluoride is approximately $2.12 per mil. gal. One ppm. of fluoride ion is added to the water to bring the concentration up to 1.15 ppm.

Mr. Zufelt also told of his experiment on the use of sodium silicofluoride as the chemical, and of his experiments to determine the concentration of fluoride in the atmosphere in his water plant. The experiments on sodium silico-fluoride were reported by Mr. Zufelt in the June

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issue of *Water & Sewage Works* and the studies on fluoride dust in the atmosphere are to be reported by Mr. Zufelt in our next issue.

According to Mr. Zufelt, any city desiring to institute fluoridation should follow these steps:

1. Pass an ordinance requiring the water department to inaugurate fluoridation.
2. Obtain approval of local health officers, and local dental and medical societies.
3. Draw up thorough plans for the procedure to be followed.
4. Publish an outline of the plans.
5. Develop precautions for the operators.

There are now 20 cities in Wisconsin where fluoridation is being practiced and 40 additional communities have passed the necessary ordinances and several of these latter have plans approved by the state board of health. Three cities are considering the use of sodium silico-fluoride.

Meter Repair

A two man panel discussed the overhaul and repair of water meters. Dan Gannon, Pittsburgh Equitable Meter Co., Chicago Office talked on "Oscillating Piston Meters" and Henry De Pagter, Chief Engineer, Badger Meter Co., Milwaukee, Wis., talked on "Nutating Disk Meters."

DISTRIBUTION SYSTEM ROUND TABLE

Mains

In opening the round table with a discussion of mains, *DEWEY JOHNSON*, Cast Iron Pipe Research Assn., Chicago, Ill., gave the following recommendations:

1. Keep buildings off of mains; don't abuse them.
2. Don't lay mains in the middle of a street.
3. Lay mains in grass parkways.
4. Don't put services in until it is necessary.
5. Don't lay mains in swamps.
6. Don't lay mains in cinders.
7. Where mains are laid under railroads, push an outside pipe through first and use mechanical joints on the mains.
8. Swab newly laid mains with chlorine.
9. Use duplicate transmission mains where possible.
10. Be prepared for repairs.

Valves & Hydrants

On the subject of valves and hydrants, *GEORGE W. WHITE*, Mueller Co., Decatur, Ill., recommended that valve records be kept showing make, size, location, type, etc. Full and complete records should also be kept of fire hydrants, their location, nozzles, size of hydrant, date of purchase, etc.

Main Cleaning & Lining

K. I. ROBINSON, Pittsburgh, Pipe Cleaning Co., Pittsburgh, Pa., explained the methods used in pipe cleaning and described the Eric Process for lining mains with bitumen in place by plating out the bitumen on the inside of the pipe.

Elevated Tanks

According to *EDWARD E. ALT*, Chicago Bridge and Iron Co., Chicago, Ill., there are 722 water supplies in the state of Illinois. More than 400 of these water supplies have elevated storage tanks. Mr. Alt reviewed the history of the development of elevated storage and the various designs of tanks which have culminated in the one-leg Watersphere, now a popular favorite. Mr. Alt also told his audience that elevated tanks are more than just storage. Properly painted and well kept, they serve as a good public relations asset.

Fire Demands

The formula for determining requirements for fire demands was described by *GEORGE TATNALL*, National Board of Fire Underwriters, Chicago, Ill. The formula is based primarily on population. Water fog systems will not reduce the requirments for water service as set by the Nat. Bd. of Fire Underwriters.

Mr. Tatnall recommended two sources of power, one underground, if possible. Standby auxiliary power should be equivalent to that necessary to maintain service at average output while drawing on storage to the safe limit of its capacity.

Water Quality Deterioration

J. C. VAUGHN, Filtration Engineer, Chicago, Ill., spoke on deterioriation of water quality in distribution systems. He referred to the Chicago main flushing program and its effects on improving the water in distribution systems. An ideal water is not only clean and pure but it is palatable. It may be expected to remain that way in a good distribution system. Causes of deterioriation in distributions systems include insanitary main laying, incomplete treatment at the water supply works, and use of improper materials in the distribution system.

Fire Dept. Requirements

Speaking for the fire departments, *A. J. MULLANEY*, Chief Fire Marshall, City of Chicago, said, "Without water at the right pressure and the right location, no fire department can meet an emergency properly."

Some of the causes of poor fire fighting include the use of fire hydrants by others than the fire department with the hydrant being left in poor condition. Unready hydrants are probably the worst problem of the fire department. Inspection of fire hydrants is cheaper than having frozen hydrants unavailable for use.

Mr. Mullaney remarked that European cities have few wooden houses and therefore need less fire protection and less water for fire service than do U.S. cities. In Chicago, fire hydrants are color coded to this extent: Those on 12-in. mains or larger and capable of delivering 1000 gpm. are painted yellow; all others are red. Fire hydrants are inspected twice a year by both the fire department and the water department.

Atomic Wastes and Water Quality

"ATOMIC WASTES AND WATER QUALITY" by W. A. Rodger, Chem. Engr. Div., Argonne National Lab., Chicago, Ill.

According to Mr. Rodger, where atomic wastes result from mixed activities in the field of radioactive

Mains
Dewey Johnson
Engr.
C.I.P. Res. Assn.
Chicago, Ill.

Fire Demands
Geo. Tatnall
Engr.
Nat. Bd. F. U.
Chicago, Ill.

Symposium Participants

Water Quality
J. D. Vaughn
Filt. Engr.
Water Dept.
Chicago, Ill.

Coagulation
J. R. Baylis
Engr. of Purif.
Water Dept.
Chicago, Ill.

Disinfection
C. C. Abplanalp
Sales Engr.
Wallace & Tiernan
Chicago, Ill.

Tastes & Odors
C. C. Larson
Supt.
Water Purif.
Springfield, Ill.

operations, ordinary water treatment processes will remove 80 to 90 per cent of the imposed load.

Mr. Rodger spoke particularly of the problems that would be involved in case of an atomic bomb explosion. There would not be much effect on the water itself if the bomb were exploded in the air. The two problems would be the effect on the pumping station and the number of main breaks. If the bomb were set off under water, the concentration of radioactivity would not be greatly dispersed. A slug in the water supply could be returned to the lake (in case of Chicago) for dilution.

At the Argonne National Laboratories, experiments are being conducted on coagulation and ion exchange to remove radioactive wastes.

Mutual Aid

"MUTUAL AID ON WATER QUALITY MATTERS" by Armon Lund, Supt., Water Dept., Wilmette, Ill.

Mr. Lund cited the work of the "WPA", the West Shore Water Producers Assn. which holds regular meetings to discuss mutual problems. This group has been active in the sponsorship of an Institute at Northwestern University under Professors Gamet and Kessler. Mr. Lund suggests the need for an Institute on Water Problems in the central and southern districts of the state.

PURIFICATION SYMPOSIUM

With *OSCAR GULLANS*, Director of Filtration Labs., Chicago, presiding, one session was devoted to "New Developments in Water Purification."

Coagulation

JOHN R. BAYLIS, Engineer of Water Purification, Chicago, Ill. spoke on the need for sedimentation of 2 to 5 hours before filtration and the problem of algae in clear water when coagulation is most difficult. Activated silica is an excellent aid to coagulation and activated carbon may serve well as artificial turbidity.

Filtration

A. E. ANDERSON, Supt., Water Works, Moline, Ill. directed his remarks particularly to the relation of turbidity to false positives and to taste and odor problems.

Disinfection

C. C. ABPLANALP, Wallace and Tiernan Co., Chicago, Ill. spoke briefly on the newer ideas on disinfection with particular reference to breakpoint and free residual chlorination.

Tastes and Odors

C. C. LARSON, Supt., Water Purification, Springfield, Ill. delved into the source of odors, their chemical composition and in what minimal concentration they can be recognized.

Softening

GERALD L. DAVIS, City Chemist, Decatur, Ill. devoted his remarks to the use of the upflow slurry type of water softening equipment. Studies have shown that rates of operation can be increased without losing the slurry.

Discussion

The following discussion from the floor took place after presentation of the prepared papers by members of the "Purification Panel".

W. R. GELSTON, Supt. at Quincy, Ill., said that breakpoint chlorination often produced aftertastes due to nitrogen-trichloride production. Best results from Quincy experiments had been breakpoint chlorination followed by de-chlorination and thereafter ammonia-chlorine treatment to hold residual chlorine in the mains. For dechlorination and nitrogen chloride removal sodium-bisulphite had been employed. For the ammonia-chlorine treatment the ratio of 2 chlorine to 1 ammonia had given best results.

GERALD L. DAVIS, City Chemist, Decatur, Ill., in reply to questions, stated that slurry consistency in the "Accelator" of 6 per cent solids had proved best. In control at 6 per cent the water waste in excess sludge removal had been cut from 450,000 gpd. to 250,000 gpd.

There had been no reduction in softening chemicals through use of the "Accelator" as compared to the old style basins still in use. On the other hand, the "Accelator" effluent contained less suspended solids and therefore relieved the filters materially.

JOHN R. BAYLIS, Engr. of Water Purification, Chicago, said that the patents on use of "Activated Silica" as a coagulation aid were the property of the City of Chicago. Municipalities were to be charged a 2 per cent royalty and industry a 10 per cent royalty. He said that the patents did not apply in softening but only in coagulation with the usual water coagulants.

Ground Water at Rockford

"ROCKFORD GROUND WATER SITUATION" by H. M. Smith, State Water Survey, Urbana, Ill.

Mr. Smith said that studies of the Rock River in the area of Rockford, Ill. had shown that the ground water level is above the river and ground water leaks out through springs into the river. The amount of water so lost from the ground aquifer to the river varies from 20 to 30 mgd. Mr. Smith proposes that while other communities may worry about lowering of ground water level, Rockford actually has a surplus of ground water available for industrial concerns that are looking for sites with ample water supply.

Water Shortages

"WATER SHORTAGES — A REALISTIC APPROACH TO THEIR CORRECTION" by Vail H. Moore, Engineer, Warren & Van Praag, Inc., Decatur, Ill.

Mr. Moore said that water shortages might be ascribed to source, treatment, pumps, distribution systems, and miscellaneous. Mr. Moore commented particularly on silting as

A Rose Between—

W. "Vic" Weir, Pres. of AWWA and Pres. St. Louis Co. Water Co., poses with the incoming (L. E. Hart) and the outgoing (Carl N. Brown) Secretaries of the Illinois section.

it effects the reduction of reservoir capacity. Quite often the cost of a new reservoir is less than would be that of trying to clean a silt laden one.

Small Community Supplies

"WHAT IS THE FUTURE FOR PUBLIC WATER SUPPLIES FOR VERY SMALL COMMUNITIES" by Ralph Wilson, Wilson and Anderson, Cons. Engrs., Champaign, Ill.; and by Vincent Newman, Barcus-Kindred & Co., Municipal Bonds, Chicago, Ill.

Of the 1155 incorporated municipalities in Illinois, 435 are without public water supply. Ninety-seven per cent of these have populations under 1000 persons; 130 are under 250, and 220 are between 250 and 500 population. Mr. Wilson considers the 350 communities with less than 500 population as "very small communities." Only about 100 towns of less than 500 now have water systems. Therefore there are about 3½ times as many communities of this size which do not have water supplies.

There are five factors which make a public water supply system for a small town less feasible than for larger towns and villages.

1. Population density is lower so greater runs of mains are required per customer.
2. Evaluation or per capita wealth is lower, makes bonding power less per capita and greater need for revenue bonds.
3. Earning power or income is less and make high rates hardest to bear in communities where rates must be highest.
4. Cost of water supply, plants, storage, etc. do not decrease in proportion to population, therefore making greater per capita first cost.
5. Operation of a small town water works is a serious problem and if properly solved the cost is high per customer served.

Despite these obstacles there seem to be expectations that many small plants will be built. Mr. Wilson does not believe that these small communities have a good opportunity to obtain a water system and he cited several observations to back up this belief.

Mr. Wilson had several suggestions which he believed might tend to offset this present lack of opportunity for small communities to build water plants. Even so, Mr. Wilson concluded that the "very small communities" are in general going to remain without water supplies for several years unless they are exploited or some unforeseen changes occur. In the communities of 500 to 1000 a few plants will be built each year but not many.

VINCENT NEWMAN, Barcus-Kindred & Co., Municipal Bonds, Chicago, Ill. spoke on the same subject and pointed out that if a small community is going to try for a water supply, they should get a good engineer, a good finance advisor, and a good bond attorney to consult with the Village council.

Officers All

Recognizable (?) here from left to right are "Dick" Gelston, new chairman; "Ed" Alt, Vice Chair.; J. C. Moomau, Past Chair.; Carl Brown, Ret. Sec'y.; "Cliff" Fore, Director; "Boone" Hudson Jr., Trustee; Horace Frye, Immediate Past Chair.; "Les" Hart, Secy.; and Oscar Gullans, Sr. Trustee.

Mr. Newman said that in order to build a plant and system there must be at least 200 users. Mr. Newman also said that to carry through the program, there must be a house to house canvas, with depositors being signed up in advance. Rates must probably be at least $2 per month and may run to $3.50 per month. He does not consider this rate to be too high. There is always, of course, the problem of a sewer system when a water supply goes in and that too should be planned for when consideration is being given to a new water supply.

Discussion which followed the two papers brought out the fact that the two speakers were not in disagreement as to the size of community which could expect to build new water facilities. Mr. Wilson had said that only communities of above 500 population might be expected to afford new water supplies, and Mr. Newman said that 200 users were necessary; i.e. nearly 1000 persons.

Arthur T. Clark Dies

Arthur T. Clark, Secy.-Manager of the Water and Sewage Works Manufacturers Assn. for the past eight years, died in a Morristown, N.J., hospital on May 24th after an illness of several months. He was 65 years old.

Born in Menands, N.Y., Oct. 4, 1884 (near Albany, N.Y.), Mr. Clark attended Rensselaer Polytechnic Institute and received the degree of Civil Engineer in 1907.

For eight years he was associated with Robert E. Horton, Consulting Engineer of Albany, N.Y., and for ten years was in charge of Electric, Water, Sewer, Police and Fire Departments at Herkimer, N.Y. For ten years he handled design, construction and operation of water systems for South Bay Consolidated Water Co. of Long Island, N. Y., Community Water Service Co. and the Town of Morristown, N.J. For several years Mr. Clark was with American Water Works and Electric Co., The Barrett Division of Allied Chemical & Dye Corp, Joseph G. Pollard Co., and National Water Main Cleaning Co.

Arthur Tyas Clark

Mr. Clark joined the Water and Sewage Works Manufacturers Assn. as Manager of the Headquarters Office on May 1, 1941, and on June 23, 1942, was appointed Secretary-Manager.

He was a member of the American Water Works Assn., Federation of Sewage Works Ass'ns., New England Water Works Assn., Railroad-Machinery Club of N.Y. and the National Ass'n. of Exhibit Managers.

Mr. Clark is survived by his widow, Elinor Palmer Clark.

Delaware
A Well Water State

Of the 31 public water supply systems listed for the state of Delaware all but two in the entire state are well supplies. In the matter of percent of ground water supplies, in comparison with the two supplies from surface sources, this is thought to constitute a record.

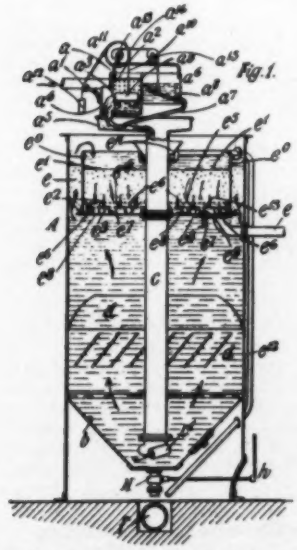
ANOTHER EARLY UP-FLOW CLARIFIER OF THE SLUDGE BLANKET TYPE

Some Comments on F. D. Prager's Paper Appearing in the April, 1950 Issue of "Water & Sewage Works"

from

SIR WILLIAM PATERSON
Windsor House
LONDON, ENGLAND

MR. Prager's article in the April issue of *Water & Sewage Works* gives an interesting, critical and historical review of the development of what, unfortunately, by common usage is now designated the "sludge blanket clarifier." He very rightly gives Archbutt and Deeley (late Chief Engineer and Chemist of our British Midland Railway) credit for devising "the most important early sludge blanket clarifier." There seems to be no doubt that they were the first to divulge the method for effecting accretion of the finely divided or colloidal precipitates, resulting from the chemical treatment, by its forceful admixture of the treated water with precipitates previously formed. There seems to be no record of the continuous flow type, illustrated in the Prager paper, ever having been adopted. No doubt this was due to difficulties experienced in its application, which become fairly obvious on a critical examination of the drawings accompanying their specification.



The Paterson Continuous Up-flow Clarifier of 1902

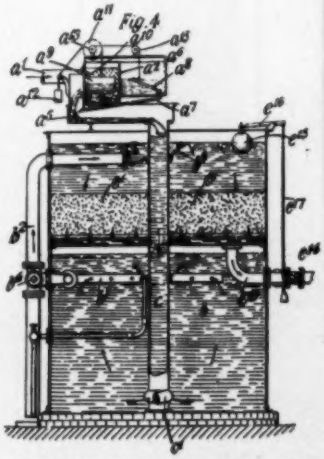
(British Patent No. 10719)

Note the "swirling nozzle" at the bottom of drop pipe, to maintain precipitate circulation, and the baffled lower slurry chamber with up-flow clarification above. In the top of these deep tanks a down-flow filter was provided.

On the other hand, in their intermittent "fill-and-draw-off" type of softener the raw water and chemical reagents were usually run into a relatively large rectangular tank and *thoroughly* mixed with large volumes of previously settled sludge. This sludge was thrown into suspension by compressed air, uniformly applied over the whole area of the tank by a suitably designed air distributing system. When the tank had become full of the admixture of raw water, Chemical reagents and lime, the compressed air was shut off and a period of quiescent settlement given for three or four hours, during which time the clarified water was gradually abstracted by a pipe or tube, functioning as a floating draw-off arm. This intermitent fill and draw-off type of softener met with great favour in the early days of this century and quite a number are still doing useful work.

The Suspended Precipitate Principle Applied in Continuous Upflow Units

The obvious advantage of effecting accretion of the fine collodial precipitate with that already formed prompt-



A Modification of the Paterson Sludge Blanket Type of Up-flow Clarifier

(British Patent No. 10719)

In this modification the tank has a lower ratio of depth to width and baffles are not included in the slurry zone, the "swirling nozzle" being considered ample for circulation of precipitate.

ED. NOTE: *It is observed from the dates on the copy of the patent submitted by the author, that the claims were granted and patent issued in less than a year from date of application, May 9, 1902.*

At long last we have discovered a way of obtaining an article from our esteemed friend, Sir William Paterson. For a long time, and especially on each of his too infrequent visits to America, we have attempted to persuade our ingenious friend to contribute articles describing some of his several inventions in the water and sewage treatment field, but without success. If it takes papers like the Prager paper, in our April issue, to cause "Sir William" to write in defence of his priority in water treatment processes and equipment, we hope there may be many more such articles.

We have taken the liberty of adding the prefix "Sir" to Mr. Paterson's named in the by-line, because of the fact that he was knighted at the end of World War II by the King of England, in recognition of the services rendered the British nation and its fighting forces in the matter of advancing the treatment and purification of water through his inventions and development of water purification facilities. We, in America, are proud of such recognition of a "fellow" in the great "society" of water supply engineers and chemists, whose members unfortunately, are denied the same type of National recognition in America that is granted in England.

The late Sir Alexander Houston was knighted years ago for his work as Chemist in Charge of Purification of London's vast water supply. And, now, to his distinguished ranks has been added the name of Sir William Paterson, once just a "commoner" who became the successful manufacturer of the well known Paterson Engineering Co., Ltd., line of water purification equipment and devices.

—L.H.E.

ed me, in 1900, to consider its application to the continuous upflow water softener by reversing the then standard method for ensuring separation of the fine preciptate by quiescent slow downward and upward flow and substituting *continuous violent swirling* of the admixture of the old precipitate with that newly formed in the base of a standard vertical flow clarifier. The principles and novel features are outlined in my British Patent No. 10719 of 1902 which would seem to anticipate this feature of Declercq's patent of 1905, referred to in the Prager article. The results obtained by this simple application of the so-called sludge-blanket continuous upward flow clarifier were entirely satisfactory and many of these units still continue to be in daily service.

A Similar American Device

More than ten years ago my attention was drawn to what is known as the "Accelator" type of clarifier, developed by your American firm, Infilco Incorporated, of Chicago, which obviously incorporates many highly valuable new features. Amongst these, I consider the following as especially noteworthy.

(a) The substantial mixing which ensures more thorough admixture of the chemicals with the raw water *and previously formed precipitate* by continued circulation in close contact with it, and not simply by the earlier slow upward passage through a layer of thin slurry.

(b) The ingenious utilization of the increased kinetic energy of the *downward flow* of the circulating slurry, thereby facilitating the separation of the precipitates from the less dense clarified water.

(c) The provision of convenient slurry concentrators to facilitate the more or less continuous discharge of sludge *with a minimum water content*.

Apparently it is these primary advantages which have been instrumental in the rapidly extended application of the "Acceleator" type of up-flow clarifier.

In closing these comments I should like to draw the attention of Mr. Prager to my 1902 British Patent to which no reference has been made in his historical review. A patent drawing of my continuous up-flow clarifier of the sludge-blanket type is being submitted with these comments.

Clyde Potts Passes

Noted Water and Sewage Works Engineer, and Long-time Mayor of Morristown, N. J., Served as President of the N.J. State Board of Health

Clyde Potts, noted consulting engineer in the water and sewage works field, died on May 19th after a heart attack at his home in Morristown, N.J. He was 73 years old.

The Hon. Clyde Potts

Mr. Potts, a native of Libertyville, Iowa, came east to take an engineering degree at Cornell Univ. in 1901. In 1904 he established residence in New Jersey to begin a useful and colorful career which began with his services to the Jersey City, N.J., in connection with the famous water chlorination case which was fought through the courts before being declared a harmless method of purifying the water supplied the city by the Jersey City Water Co.

Mr. Potts was also instrumental in breaking the Cameron patents on septic tanks by proving that the solids were not completely disposed of as claimed, and that the patents had been anticipated by prior act.

One of the earliest sewage treatment plants to employ separate sludge digestion was that at Boonton, N.J., designed by Mr. Potts in 1922. The gas was used for heating glass-covered sludge drying beds. Also one of the early plants to employ digester gas for gas-engine was that of Rockville Center, L.I., designed by Mr. Potts in 1924.

While continuing his engineering practice Mr. Potts served as a member of the N.J. State Board of Health for 25 years. For two terms he served as president of the Board—quite a distinction for a sanitary engineer, and probably the only case of its kind since this position is ordinarily occupied by a medical man and not an engineer. He was a prime mover in the establishment in 1915 of the N.J. Sewage Works Ass'n., the first of its kind in America. He was also instrumental in securing legislation in 1918 which established the licensing of water and sewage works operators in New Jersey.

As the outgrowth of Mr. Potts interest in the water supply of Morristown, N.J., he was elected mayor and was thereafter reelected to this office a number of times and completed 24 years of service when he retired on Jan. 1, 1949, at the age of 72.

Shortly after his service began with the State Dept. of Health Mr. Potts established a new policy which was expressed in a speech by him before the N.J. Sewage Works Ass'n. in the following words:

> "It is not the purpose of the Health Department to spy on the attendants at New Jersey disposal plants. It is the purpose of the Department and its employees to help every operator who may be in trouble, and we wish you to tell our inspectors and engineers of your difficulties and troubles whenever they call at your plants. We do not wish you to conceal anything, because when you are dealing with the Department you are dealing with your friend."

Mr. Potts left many monuments in his home community of Morristown and environs. Perhaps the most important of these civic improvements is the Morristown National Historical Park which he got the Government to establish. Another is the Morristown Airport. A plaque has been installed in Morristown City Hall commemorating Mayor Potts' "sacrifice and devotion to his community—one of the finest in the Nation."

Mr. Potts is survived by his widow and two daughters. His consulting engineering office will go on under the able guidance of his friend and chief administration engineer—Weston Gavett.

C. C. West Retires After 50 Years

Col. H. P. Wilbur, President, Sayre Water Co., Sayre, Penna. has announced the retirement of Charles C. West after fifty years service with the company. Mr. West retires as General Manager, but will continue in the capacity of Vice President, Secretary and Treasurer of the company.

Appointed to the position of General Manager is George M. West, who has been with the company for 22 years, as assistant general manager. David C. Meyer has been appointed to the position of Asst. Gen. Mgr.

Change in Consulting Engineering Firm

N. W. Haner, formerly practicing engineering under his own name in Portland has changed the name of his firm to N. W. Haner & Associates, Engineers and Consultants. The firm is now located at 220 S.W. Alder St., Portland, Ore.

THE OPERATION AND CARE OF CENTRIFUGAL PUMPS*

by

CHARLES E. COLEMAN
Engineer
DE LAVAL STEAM TURBINE CO.
TRENTON, N. J.

HAVE you ever asked yourself the question—"What does it matter to me regarding the operation and maintenance of a centrifugal pump"?

There are two answers—First, if the pump operates satisfactorily; that is, pumps the required capacity at the correct head at the highest efficiency, then there will be a saving of dollars and cents in operating costs. Second, if the pump's maintenance is satisfactory, free from packing trouble, misalignment, coupling trouble, bearings run cool, there will also be a saving in dollars and cents in maintenance costs and wear.

Here is a typical example of a water system which has been satisfactory in operation and low in maintenance. This particular city pumps the raw water from a nearby river to the filter beds; the filtered water from the clear well is again pumped to a reservoir, and thus to the city mains. The cost of pumping is $8.61 per million gals. The monthly power bill is approximately $9,400 and the yearly cost for pumping is approximately $113,000.

The maintenance cost over a period of 15 years has averaged only $455 per year for all of the eight units, which is composed of four (4) 20 M.G.D. low head pumping units; two (2) 20 M.G.D. and two (2) 15 M.G.D. high head pumping units.

With such an expenditure for power for pumping each year you can readily see the importance of efficient operation and low maintenance. The pumping units in the water plant are doing millions of foot pounds of work daily; and when, at the end of the month or year, the energy or power required to do this work is reduced to a common denomination of dollars and cents, the answer is one of real importance in the overall cost of water for the municipality, large or small.

*A paper, based on lectures presented at the 2nd Annual Penna. Water Works School, State College, Pa.

The Author

How to Keep Power Costs Down

How can the cost of this power required by the pumping units be kept as low as possible, consistent with the work to be done? The answer is obvious, keep the pumping units in perfect mechanical condition and operated under such favorable conditions that they will consume the minimum amount of power for the necessary amount of work to be done.

Let us discuss how these desirable results can be obtained. The centrifugal pump as you know is made up with a volute shaped casing, and an impeller securely keyed to a revolving shaft properly supported by bearings, and driven through a flexible coupling by an electric motor or steam turbine as a rule. The impeller is sealed between the suction and discharge portions of the casing by labyrinth type wearing rings to reduce the water leakage (slippage) to a minimum. Where the shaft extends through the casing it is sealed by means of a stuffing box, which should be suitably lubricated. It should not be under too great a pressure, because this will create friction and wear the bronze sleeve that protects the shaft.

Suppose a motor driven centrifugal pump has been delivered to your water pumping station to be installed and operated by you. Assume this pump was designed for 3 MGD or 2080 GPM against 160′ total dynamic head, and operated at 1750 rpm, requiring a 100 HP motor. The manufacturer had guaranteed a pump efficiency of 84% and an overall wire to water efficiency of 76.5%. The guarantee of 84% efficiency means that 16% is the mechanical loss along the way between the suction flange and the discharge flange of the pump. We will analyze this loss to see if the operator can, in some way help correct this. The answer is "No"—but he can help to keep this loss at only 16% and not let it get to be 19 or 20%, which will result in a needless loss in dollars and cents.

The 16% loss is made up in the following manner: 12% is lost in converting the velocity developed by centrifugal force in the impeller to pressure, plus the loss in friction due to the water passing through the pump casing; eddy current loss in the casing and shocks in the pump. 2% is lost in the wearing rings that seal the discharge from the suction chamber. 1% is lost in skin friction which is created by the revolving parts moving in the water, and 1% is lost in the bearings and the stuffing boxes.

The operator or owner can be responsible for any increase in loss above the 16% loss which can be due to faulty bearings, improper adjustments of packing glands, and not periodically checking wearing ring clearance. Therefore, the pump unit should be carefully lined up by a competent mechanic, and should have neither the suction nor discharge piping resting or hanging on the pump flanges. This piping should have substantial supports of its own, in order to relieve any strains on the pump casing.

Care in Installation and Starting New Units

The flexible coupling will serve as a gauge to determine whether or not the pump unit is in proper alignment, since the faces of the coupling are machined and ground together with utmost precision. The alignment of the pump can easily be checked, using a straight edge, leaf gauge, and a spirit level, before the coupling bolts are inserted. This pump, if properly leveled, could be grouted on its foundation. You should recheck the alignment before and after the

suction and discharge piping are bolted to the pump, as a pipe strain will often throw the pump out of alignment. You cannot rely on the baseplate to maintain perfect alignment, as it is subject to distortion in shipment and may be sprung. If you find that the rubber bushings in the flexible coupling are wearing unevenly or if the other types of coupling show an uneven wear, the alignment should be checked and corrected. The misalignment will cause excessive wear in the stuffing box and the bearings. If the misalignment is excessive it will cause the shaft to whip and eventually break. By maintaining perfect alignment you can save up to 2% in power cost, plus the cost of packing and other replacements.

After the pump is properly set up and ready to operate, it must be filled with water, primed. This priming can be done by means of an ejector, a vacuum pump, or by putting a foot valve on the end of the suction pipe and filling the pump with wather. The sleeve bearings should be inspected soon after the unit is started to determine whether they are properly lubricated. However, if grease lubricated ball bearings are used, the inspection must be done before the unit is started.

It is important that the packing is properly adjusted so that there is a slight drip of water visible at the end of the stuffing box. This will prevent air from leaking into the pump and assure you that the packing in being lubricated. The packing box gland bolts should be screwed up evenly and tight and then slackened off and retightened only thumb tight. By having the lantern ring correctly spaced in the stuffing box you are assured of a proper water seal. The sealing water should be from some outside source, especially if the pump is handling raw water containing foreign matter. The sealing water should be throttled or a float tank used so that not more than 5 lbs. pressure is on the lantern ring, as excessive pressure will destroy the packing, waste water, and endanger the adjacent bearings. The packing is usually a good grade of graphited asbestos with a grease binder. It requires water for lubrication. This is all important as it will reduce friction and maintain the guaranteed efficiency of the units.

If the stuffing box is not properly adjusted and the glands are pulled up too tight the shaft sleeves will wear very rapidly, which will increase the maintenance cost and decrease the efficiency of the unit. You not only must consider the cost of the new sleeves to be replaced but also the labor and time to take the unit apart to replace the sleeve, and also the inconvenience of having a unit out of service.

The purpose of the shaft sleeves is to prevent the liquid pumped from getting on the shaft, causing deterioration by corrosion, and preventing the stuffing box packing from wearing directly on the shaft. The shaft sleeves are removable and can be purchased at a small cost compared to the price of a pump shaft. However, the stuffing box should be periodically inspected and the packing properly adjusted in order to reduce wear even on the shaft sleeves.

The High Cost of Ring Wear

The wearing rings in the pump casing that seal the space between the suction and discharge chambers are one of the most important parts of the centrifugal pump. If these rings are not properly designed, or become worn, the efficiency of the pump will drop off 2 or 3 percent after a short span of operating days. Therefore, it will pay to purchase a pump with removable wearing rings in the case and on the impeller. There are a number of different types of wearing rings. Some have flat surface and a small running clearance, some have only impeller rings with a small running clearance between casing and ring. The better type of renewable wearing rings are the labyrinth-type which offers the maximum resistance to the flow of water from the discharge chamber to the suction chamber. This type of wearing ring will have approximately .016″ clearance as against the conventional flat ring with approximately .008″ clearance to maintain the same rate of leakage. Of course, the larger clearance of the labyrinth rings reduces the velocity of flow through the rings and points the way to longer life of these rings, thereby effecting a higher sustained overall efficiency of the pump and making it unnecessary to change these rings at too frequent intervals. One is more concerned with the average sustained ring efficiency than with high initial efficiency, rapidly lost by ring wear.

The impeller rings should be made with left and right hand threads in order to screw on the shoulder of the impeller so that the direction of rotation of the pump will tighten the rings, the case ring should be held firm in the pump without the use of pins or screws.

As we have a 2% loss in efficiency through the wearing rings it is important that the correct type be used and the proper clearance be maintained. Let us assume that the wear on the flat ring increases from .008″ to .016″ then the leakage will increase and the loss will be 4% instead of 2%. In dollars and cents this will be considerable over a period of a year. If the labyrinth rings were worn an additional .008″ and you had .024″ clearance the loss would be only 3% instead of the 4%, with the flat type rings. However, it is not probable that the wearing rings with the low velocity and large clearance will wear to the extent cited. Therefore, you can see the importance of checking the ring clearance periodically, so they can be replaced before the losses at this point become excessive. This is especially true for raw water pumps of any of the pumps handling some silt or grit. Some of the larger pumping stations, such as in the City of Minneapolis, keep a constant check on their wearing rings and, when the pump output has dropped off a given amount, new rings are installed and the efficiency of the unit is restored to the original guarantee.

About Bearings

The final maintenance item of a pump is one that is common to all operating machinery, namely the bearings. It is well known that it is economical to use the best grade lubricating oil for sleeve bearings, and that these bearings should be inspected each time the pump is started, to be certain that the oil ring is revolving. Ball-bearing pumps should be only lightly packed with grease. The bearing housing should be thoroughly cleaned and the oil or grease renewed when required, or at least twice a year. Care should be taken to keep the bearings free from chemicals, dust, etc., especially when pumps are installed in rooms where such abnormal conditions exist.

Some Fundamentals

Let us review a few fundamental facts that are important for a water works man to know. First water is wet and some people drink it and others use it to bathe in, others to put out a fire; but, this same water has certain characteristics, it is made of H_2O and in a liquid form will seek its level; therefore, it must be pumped if it is to be removed from a lower to a higher level.

We have the following terms:

Capacity:—Gallons per minute (G.P.M.)
Water at 68°F weighs 8.335 lbs. per gal.
Head:—Total Dynamic Head (TDH) in feet
2.31 ft. of head equals 1 lb/sq. in. of pressure.
Static suction head or lift
Static discharge head
Friction head, both suction and discharge

Velocity head
Specific Gravity—Density, 1.0
Viscosity—Saybolt seconds Universal, 32 SSU for water
Water Horsepower (WHP), 33000' lb/min.

$$\text{Brake Horsepower (BHP) is} \frac{\text{WHP}}{\text{Pump. Eff.}}$$

$$\text{Pump Efficiency (percent)} \frac{\text{WHP}}{\text{BHP}} \times 100$$

The pumping rate which we know as pump capacity, signifies rate of flow and consequently must include a time element. For this time factor we use the minute, giving us capacity in gallons per minute (G.P.M.). It will be found that some large capacity units are spoken of in terms of cubic feet per second (c.f.s.) or in terms of million gallons per day (M.G.D.). These latter terms are purely arithmetical multiples of gallons per minute, and our accepted standards are based on gallons per minute (G.P.M.).

The head is measured in feet and if read on a pressure gage it is converted into feet by multiplying by 2.31, as above indicated. The static head (difference in elevation from the centerline of the pump to the level to which the water is pumped) can be measured. To this must be added the friction loss in the pipe line plus the velocity head. The last named is the head necessary merely to accelerate the water. This calculation must be included when a given amount of water must flow from a large opening to a small opening, which, of course means that the velocity of the water has been speeded up. The difference in size of suction and discharge lines accounts for the necessity of making this calculation.

$$Vh = V^2 \frac{\text{Velocity in ft/sec.}}{\text{acceleration due to gravity } (32.2'/\text{sec.})}$$

The difference between the velocity head in the smaller pipe and the larger pipe represents the total velocity head to be included in the T.D.H.

The specific gravity of a liquid is the ratio between the weight of an equivalent volume of water. Water at 68° F weighs 62.355 lbs. per cu. ft. and has a specific gravity of 1.0. Water at a higher temperature, oil, gasoline and other liquids which weigh less than 62.355 lbs. per cu. ft. have a specific gravity of less than 1.0, while heavier liquids such as brine will have a specific gravity of more than 1.0.

A horsepower is the amount of energy required to lift 33,000 lbs. a distance of 1 foot in 1 minute. Therefore, the water horsepower required to move a volume of water in a specific time to a given head is

$$W.HP = \frac{\text{lbs. of liquid pumped} \times \text{T.D.H.}}{33000}$$

$$= \frac{(\text{GPM} \times 8.34 \times \text{Sp. Gr.}) \times \text{T.D.H.}}{33000}$$

$$W.HP = \frac{\text{GPM} \times \text{Sp. Gr.} \times \text{T.D.H.}}{3960}$$

as cold water has a Sp. Gr. of 1.0 we can drop that unit, and—

$$W.HP = \frac{\text{GPM} \times \text{T.D.H.}}{3960}$$

$$\text{Then, pump eff.} = \frac{\text{GPM} \times \text{TDH}}{3960 \times \text{BHP}} \times 100$$

Thus, the efficiency of a 3 MGD (2080 GPM), 160' T.D.H. pump requiring 84.0 BHP would be:

$$\text{Eff.} = \frac{2080 \times 160}{3960 \times 84.0} \times 100$$

$$\text{Eff.} = 84.0\%$$

The input is measured in ft. lbs. (torque) where a dynamometer is used, as in a testing laboratory, however, you will have a watt meter to measure the kilowatts required by the electric motor. We know that 1 horsepower is equal to 745.7 watts. Therefore, the kilowatt hours per 1000 gals. pumped is figured as follows:

$$KWH/1000 = \frac{\text{head in feet} \times .00315}{\text{pump effic.} \times \text{motor effic.}}$$

The viscosity of the liquid is that property which resists any force tending to produce flow and is independent of specific gravity. The value of viscosity is based on the number of seconds required for a definite volume of liquid under an arbitrary head to flow through an orifice of a definite size. In this country the Saybolt Universal Viscosimeter comparison is used. The viscosity of the liquid materially affects the flow through a centrifugal pump. If the 8/6" pump designed for 3 M.G.D. or 2080 GPM at 160' head was to handle liquid with a viscosity of 2000 SSU the capacity and head would drop off about 10% and the efficiency about 64%. The pump will deliver only 1870 GPM against 144' head at an efficiency of 54% and the brake horsepower would be 127 BHP, and with oil having a specific gravity of .9 would require 114 BHP.

Daily Routine Check-Up

Each pumping unit should be checked every day to determine the amount of capacity delivered and the total dynamic head pumped against in order to observe if and when any change takes place. If the power required to drive the pump is increasing then the pump should be inspected for alignment, stuffing boxes too tight, or not operating at its designed conditions.

If the capacity has dropped and the head and power remain constant the pump should be inspected for excessive leakage across the wearing rings.

It would be advisable to keep a running log of your pump operation and know each day and each hour of the day the power required to operate the unit per 1000 gals. pumped. Without this check-up money can be burned up awfully fast in the form of power bills.

We have found, in comparing installations that has given considerable trouble with installations that have maintained high efficiency and low maintenance cost, that the differences in the operation of the two stations have been mainly due to faulty housekeeping.

We find that if a station is well painted, the floors scrubbed and the brass properly polished that the same man will then maintain his unit with the same degree of interest and pride, and therefore will not allow the stuffing box to leak excessively or the oil to drip out of the bearings, or the coupling to be out of alignment, and in turn, he will then maintain the high efficiency guaranteed and a low maintenance cost. Whereas, the man who does not have a clean station and allows his oil to leak out of the bearings will have bearing trouble, and if his coupling is not properly aligned, will have stuffing box trouble and maybe a broken pump shaft due to misalignment.

Therefore, it is good overall economy to maintain a pumping station in spick and span condition and in proper order.

Florida Water Works Construction Program

According to David B. Lee, Director, Bur. San. Engr., Florida State Board of Health, public water works construction in the past four years in Florida were valued at $12,795,869. A total of 135 plants were built during 1946-49. This included 81 municipal projects at a cost of $12,025,682 and 54 sub-division projects.

In addition 14 more plants and distribution systems had plans approved and construction has begun in 1950. The cost of these plants will be $6,182,000.

Included in this latter group are Jacksonville, Winter Haven, and Ocala.

WHAT I'VE LEARNED ABOUT CATHODIC PROTECTION

An Open Letter from One "Super" to Another*

Dear Bill:

SURE was glad to get your letter which I would have answered sooner, but I've been out of town for a few days.

I had a little vacation coming so I decided to go out to St. Louis to visit my brother—hadn't seen him for some time and since we're sorta getting along in years we like to get together whenever we can.

Well, we had a good visit and while I was there he persuaded me to go to the NACE meeting with him—he's with one of the oil companies, you know, and they nearly all attend that meeting. This NACE is the National Association of Corrosion Engineers and, boy, do those fellows give CORROSION a going over. It's just like the AWWA meetings to us.

You get some idea how serious they are about it and also why they have to be serious when you hear them talking about how many thousands of dollars corrosion costs—and how they go about preventing corrosion. And, mind you, these men aren't just dreamers, they're practical operating men—engineers and technical corrosion experts. Why, on their pipe lines, they coat and wrap them with just about everything but the kitchen sink — put them in trenches just as carefully as if they were glass—backfill gently and then on top of that they put on Cathodic Protection because they say even the best coating can't always be depended upon when out of sight in the ground and that extra safeguard is needed in case weak spots appear in the coating. You know Cathodic Protection is a lot older on oil and gas lines than in the water works field.

I must admit there were a lot of papers I didn't understand—things about the highly technical phases of corrosion and methods of combating it—but I did enjoy a lot of the program — especially the part on cathodic protection. Even here there was a lot of technical discussion I didn't understand about things like minimum current density requirements, the meaning and use of attenuation curves and so on that I did not understand. But, I guess I enjoyed it because we've been hearing more and more about cathodic protection lately, because it's something that can be important to us in waterworks operations, too.

I've sort of been inclined to take the claims for Cathodic Protection "with a grain of salt" before, but when I heard those men talking about the thousands and thousands of dollars they spend for it every year on pipe lines and other structures, I sat up and took notice.

I asked some questions about how and where cathodic protection could be used and who did that sort of work, and whether they thought it was worthwhile in waterworks. Well you should have heard the answers. First they said that it could be used just about everywhere—pipe lines, penstocks, tank bottoms, buried cable, inside water tanks, filters, clarifiers, flocculators, deep well pumps, piling, hot water tanks, intake screens and even on ship bottoms while the ships are in service.

And, This Sounded Like Sense

As to whether or not it was worthwhile, they said "definitely" but then they pointed out that you had to look at the economies involved to see just how much cathodic protection you should use. For instance, they said if you really wanted to protect the inside of a water tank, you should use a good protective coating in the first place and add cathodic protection to sort of police the weak spots and breaks that you are apt to get in the coating sooner or later. That's the cheapest overall protection over a period of years, and gives the best job. Then they said you could do just about as good a job with cathodic protection alone and no paint at all but that it would cost more —about as much as painting every two or three years. Finally, they said if you used paint, no matter how good it was, you couldn't possibly prevent some deterioration and leaks because breaks would develop in the paint film and, taken alone, painting would prove the more expensive method if you really did it right. They gave me the scientific reasons of why paint alone wasn't as good as cathodic protection plus paint, but I won't try to explain all that. These engineers and chemists seemed to know what they were talking about, so I'm ready to take their word for it.

They did tell me one other thing that was interesting, and that was that you can't just order Cathodic Protection like you would a pump or a chlorinator, or some other piece of equipment. Actually, the equipment you get doesn't amount to very much in the way of cost and there are a number of manufacturers of the equipment. Mostly, it is the engineering and design that's back of the actual installation which counts far the most as I understand it. Of course, there are things about the equipment to check such as the rectifier capacity, number of anodes to be put in the tank and so on, but you need to especially check up on the design. Things like the spacing of the anodes and their size, how much current is to be applied. And, all important, is the question will it be properly distributed. In other words, it's an electro-chemical engineering service and not just the writing of specifications and buying of equipment.

Well, anyway, Bill, I'm interested enough since I attended the meeting of those Corrosion Engineers, that I'm going to call in some of the people doing that sort of work and have a talk with them. I think maybe cathodic protection will help us solve some of our corrosion problems in the elevated tanks and clarifiers especially. You can be sure, too, that if we go ahead with it, I'm going to try to follow the principle you and I have always advocated—deal with someone who has the experience and a record of successful installations that I can rely on.

I'll let you know how I make out and am looking forward to seeing you soon.

Best regards,
Tom.

*Ed Note: This is one of the "Open Letters from One Superintendent to Another," such as we ran a series of a few years back. It has been suggested that we again start these "Dear Bill" or "Dear Tom" letters. If you have a pet peeve, a "gripe" or a suggestion which you think will help a fellow operator, why not put it in the form of one of these "Dear Bill" letters. You may not wish your name used with the letter; if so we will respect your wish—but the more of these "Open Letters" the better.

MD.-DEL. WATER & SEWERAGE ASSN. MEETING*

President
R. E. Fuhrman
Supt.
Sew. Treat. Wks.
Washington, D.C.

1st Vice Pres.
L. E. McClung
Ch. Oper.
Filter Plant
Washington, D.C.

The 23rd Annual Conference of the Maryland-Delaware Water & Sewerage Assn. was held April 27-28 at the Fort Cumberland Hotel, Cumberland, Md., with a registration of 150.

Business Meeting

A general revision of the Association's Constitution was approved so the new officers will serve from the end of this meeting until the end of next year's meeting. The new officers are:

President
Ralph Fuhrman, Supt.
Sew. Treat. Wks.
Washington

1st Vice-President
L. E. McClung, Ch. Oper.
Dalecarlia Water Works
Washington

2nd Vice-President
Victor Faivre, Chem.
Water Works
Wilmington

Secretary-Treasurer
W. McLean Bingley, Asst. San. Engr.
Md. Dept. Health
Baltimore

Executive Committee
Roy Ritter—Baltimore—1 year term
W. R. Walter—Frederick—2 years
E. F. Donaldson—Annapolis—3 years
R. L. Nichols—Laurel—4 years

The meeting was outstanding in the excellent arrangements made by Wm. J. Edwards, former Water Commissioner of Cumberland, and his Local Committee. The annual dinner at the Ali Ghau Shrine Country Club was excellent. The Arthur Bedell Award for the Association, made each 3 years, was presented to *DR. ABEL WOLMAN* for his efforts in forming the Association (he was the first President) and his accomplishments in the sanitary engineering field. Mr. Fuhrman made the presentation in the absence of Harold Kemp, Chairman of the Award Committee.

Mr. Fuhrman also announced the decision of the Executive Committee to hold the 1951 Annual Conference in May at Ocean City, Md.

La Vale San. Dist.

"BIRTH PAINS OF THE LA VALE SANITARY DISTRICT," by W. A. Douglas, Chairman.

A. S. Bedell Award
Dr. Abel Wolman
Prof. San. Engr.
Johns Hopkins Univ.
Baltimore, Md.

Mr. Douglas discussed the difficulties of getting legislative authority to organize the La Vale Sanitary District to provide a satisfactory water supply to this area immediately above the Narrows on Braddock Run adjacent to Cumberland. Legislation passed in 1948 was subject to referendum which passed with a 16 vote majority. Opponents fought the election on the grounds that only 6 days notice was given and one polling place was in a bowling alley (in Md. no polling place can be in a place of amusement). The lower court decided the election was invalid, the La Vale Civic Improvement Association appealed and the Court of Appeals overruled the lower court 6 to 0. The legislature, then in session in 1949, then passed another act which completely changed the Sanitary District so the Civic Improvement Association were successful in having this act vetoed by the Governor and finally the way was clear under the 1948 authority to proceed to obtain satisfactory water for the area now served by 5 private water companies.

Since the bill had only the credit of the Sanitary District back of bonds instead of full faith and credit of Allegany County (as most other sanitary district bills in State have) there was only 1 bidder on $350,000 bond issue at 4 per cent. The bonds were finally negotiated for sale at 3.25 per cent, or nearly 1 per cent higher than if full faith and credit had been in act. Total bond issue is about 7 per cent of 1950 assessable value of District of $5,155,-395.

Whitman, Requardt and Associates are consulting engineers and work has been bid about 5 per cent under estimate; bids were taken April 18. Water will be obtained from the City of Cumberland under a contract by the Sanitary District.

"PROPOSED SEWAGE TREATMENT FOR CUMBERLAND" by G. J. Requardt, Cons. Engr. and Ralph L. Rizer, City Engr., Cumberland.

Messrs. Rizer and Requardt gave a brief description of the present sewerage system of Cumberland, Md., discussed the need for sewage treatment and outlined the proposed sewage treatment works. The new plant is neither complex nor expensive. Financing will be paid for by sewer service charges of about 30% added to the water bill.

"OPERATION OF FREDERICK SEWAGE TREATMENT PLANT," by R. G. Hartman, Chief Operator, Sew. Treat. Plant, Frederick, Md.

Mr. Hartman described the history of sewage treatment plant at Frederick. Primary treatment with vacuum filtration of raw sludge and incineration of filter cake and refuse at the treatment plant site was installed in 1935-37. Biofilter for secondary treatment added in 1949.

"POLLUTION STUDIES OF BALTIMORE HARBOR" by Chesley E. Garland, Research Associate, School of Engineering, Johns Hopkins Univ., Baltimore.

2nd Vice Pres.
Victor Faivre
Chem.
Water Dept.
Wilmington, Del.

Secy.-Treas.
W. M. Bingley
San. Engr.
Md. Dept. H'lth.
Baltimore, Md.

*From notes supplied by W. McLean Bingley, Asst. San. Engr., Md. Dept. of Health, Baltimore.

Executive Committee

Roy H. Ritter
Cons. Engr.
Baltimore

E. F. Donaldson
Ch. Engr.
Water Works
Annapolis, Md.

Mr. Garland discussed the studies being made of the sources of pollution in Baltimore harbor. He described the changes noted in the harbor waters under tidal changes and outlined the magnitude of the work which has been about two years in progress.

"CUMBERLAND WATER EXPERIENCES AND IMPROVEMENTS," by Wm. J. Edwards, Commissioner of Water, Cumberland, Md.

Commissioner Edwards reviewed the history of the water supply during his 50 year residence in the community and described the present plant, its operations and results.

"BALTIMORE'S DESIGN OF SMALL SEWERS," by Bernard F. Suwall, Prin. Assoc. Eng., Bureau of Sewers, City of Baltimore.

Usually small sewer designs are made to serve land developments. Flows for design are based on 135 gal. per capita with this average flow multiplied by a factor of two for flows of 25 cfs. or more and a factor of four for small flows.

Baltimore usually constructs sanitary sewers in the pavement area of streets 60 feet or less in width with the sewer 5 to 7 feet from curb on low side of street. When streets exceed 60 feet in width, it is usual to construct two paralleled sewers in the footway area. House connections are 6-in. diameter minimum and laid on 2 per cent grade with 4-ft. cover at property line and 6-ft. cover at curb. Main line sanitary sewer requires 8 inch pipe as minimum. Vitrified clay pipe, standard double strength, except that depth of socket is ¼ inch longer, is specified.

Sewers for developments are built at no cost to City and become City property when completed although City may participate in cost if offsite properties must be provided for or if outlet is offsite.

"WATER AND SEWERAGE FOR CONSOLIDATED SCHOOLS" by J. R. McComas, Maryland Dept. of Health, Baltimore.

Programmers

G. J. Reguardt
Cons. Engr.
Baltimore

J. R. McComas
San. Engr.
Md. Dept. H'lth.
Baltimore, Md.

Mr. McComas pointed out that water and sewage problems at rural schools is quite a problem as it compares in size with that from a town. New consolidated schools may go to 1,500 pupils and teachers, comparable to a town of 750 persons, although school sewage and water uses occur in an 8 hour period as compared to 16 hr. or more for a town. He discussed the experiences in Maryland where many schools have sewage disposal problems because of failure to consider sewage disposal when school sites are selected.

WROUGHT IRON PIPE USED IN SEWER CONSTRUCTION THROUGH TOUGH TERRAIN

On this sewer in Fulton County, Ga. (Atlanta project), wrought iron pipe was used in 20 locations where the going was especially difficult. In the accompanying picture an 120 ft. section of 18" pipe is mounted on piers at a creek crossing typical of the countryside.

In the 20 locations where a resilient pipe appeared to be indicated more than 30 tons (1,888 ft.) of 10-12 and 18-inch wrought pipe was used, representing another instance in which corrosion resistant wrought iron pipe is being increasingly employed in sewer construction.

32 Manufacturers To Exhibit at NEWWA Poland Spring Meeting

According to an announcement by Miss Dorothy E. Dimmers, Act. Secy.-Mgr. of the Water and Sewage Works Manufacturing Assn., thirty two members of the Assn. have reserved exhibit space for the forthcoming New England Water Works Assn. Convention to be held at the Poland Spring House, Poland Spring, Me., September 17-20, 1950.

In addition to the pleasures offered by the location, the technical sessions are expected to draw a record crowd as well.

"In the Springtime—I Loved Her 'Cause She Was So Beautiful!"
(Courtesy the Canadian Section)

SAND BEDS VS. SHALLOW LAGOONS FOR SLUDGE DRYING

A Study of the Relative Merits of Underdrained Sand Beds and Shallow Lagoons for Dewatering and Drying Digested Sludge

by

A. M. RAWN
Chief Engr. & Genl. Mgr.

and

W. F. GARBER
Plant Chemist

LOS ANGELES COUNTY SANITATION DISTRICTS
LOS ANGELES, CALIF.

SINCE 1928 the Sanitation Districts' staff has been comparing the relative efficiencies of two different methods of open air drying of digested sludge. These are—(a) underdrained sand beds and (b), shallow, earth lagoons. (The latter are herein termed "Field Beds," and are built in heavy, fairly impervious black clay.)

Conclusions reached in the studies have varied from time to time, with changes in methods of operation and with improved methods of stirring and drying the digested material on the beds. The conclusion now is that the "Field Bed" type of drying is by all odds the most economical method of the two for the climatic conditions of Southern California, and is also equally satisfactory otherwise.

In 1928 twenty underdrained sand beds, each 60 by 100 feet in plan with provision for maximum sludge depth of 14 inches were constructed as a part of the original Districts' disposal works. The beds were conventional in type with 4-inch drains spaced at intervals of 15 feet across the short axis of the bed; covered with 4 inches of 2-inch gravel; 2 inches of ¾-inch gravel, and 4 inches of sand. These beds were used to their maximum capacity from 1928 to 1937. In 1930 the Districts supplemented these beds with others of the above referred to "Field" type, and the two methods of drying were operated in parallel from 1930 to 1937.

During the four years, 1931 to 1934, inclusive, the amount of sludge dried on the underdrained beds was carefully measured and found to be 663 tons per acre of bed surface per year. Field Beds in the same period, and under methods of operation used at the time, yielded only 342 tons per acre per year. The tonnage of dewatered sludge collected and shipped by the contractor, purchasing sludge in place on the beds, during the four year period, was used to determine the above figures.

Late in 1937 the practice of drying digested sludge on the underdrained beds was abandoned and since that time all digested sludge at the Districts' plant has been dried in Field Beds.

Design of Field Beds

Currently, the District operates 25 Field Beds. The beds are constructed by grading to the best contour advantage on District property and diking off with earthen dikes into fairly equal and regular areas. The average bed area is 1.14 acres. The dikes allow the beds to be filled to a depth of 3½ feet, although it is customary, when possible, to fill only to a maximum depth of 2 feet. Soil in which Field Beds are built is a tight,

L. A. County Sanitation Distr. "Field Beds" for Sludge Drying
Bed in Foreground Has Been Stirred Once with Plow Nosed Crawler-Tractor. Dry Macerated Sludge in Piles.

"Field Bed" Emptied, Graded and Ready for Refill
There Are 25 Such Beds, Averaging 1.14 Acres Each.

black clay that allows little, if any, infiltration into the sub-soil. To allow for decantation of the water which separates out as the bed is filled, two variable height weirs are built at the outlet end of each bed. This water, or sludge liquor, is returned to the plant influent.

The custom at the Districts' Disposal Plant is to deliver to the purchasing contractor liquid digested sludge on the drying bed. However, the land and the construction cost of the bed as well as the cost of power, labor, re-sanding, maintenance, and supervision required for delivery of the wet sludge to the drying bed are District costs. As soon as the wet sludge is delivered to the bed by contract it becomes the property of the buyer, and it is his responsibility to perform all necessary operations involved in turning or stirring, drying, and removal, as well as the preparation of the bed surface for re-filling. Thus, there appears in what follows two costs; one noted as the District Cost and the other, the Contractor's Cost.

In 1934 an analysis of the cost of operation of both underdrained sand beds and Field Beds was made. It has been determined that at that time the Districts' Cost per ton of dry solids delivered to underdrained sand beds was $2.75 and the Contractor's Cost for handling and removal was $1.50. Similarly, at the same time, the Districts' Cost per ton of dry solids delivered to the Field Beds was only 25 cents and the Contractor's Cost only 63 cents for handling, removal and bed preparation.

Thus, the total cost of operation per ton of dry solids on the underdrained sand beds was $4.25, while that on the Field Beds was 88 cents. However, the manner in which the Field Beds were then operated permitted the drying of twice the amount of sludge on the underdrained beds as could be dried on the same area of Field Beds, a factor which tended to favor the construction of underdrained beds and, to some extent, offset the cost advantage of the Field Bed drying.

The original Field Beds operated by the District in the early '30's were built with a slope of one inch per 100 feet toward the outlet end. This induced the well digested sludge to spread evenly and the separated water to travel to the decanting weirs. Sludge was discharged onto these early beds to the required depth and such water as would, was allowed to separate out; flow to the outlets, thence back to the plant influent. The beds were not disturbed until dry, at which time the sludge was removed.

Improved Current Practice

The current practice in the drying of sludge has been evolved by trial and error. The beds are now much larger; are filled to a depth from 2 to 3½ feet, depending upon the season and the weather conditions, and when all of the water (which will) has drained out, and a fair crust has formed over the beds, a small tractor is driven through the sludge to turn it over and expose the wet material lying under the crust. The tightly compacted sub-soil permits this to be done without bogging down and the nature of the sub-soil is such that the damp digested sludge separates easily and cleanly from it.

With the present system of operating Field Beds it is possible to dry on them just about the same amount per acre per year (685 tons) as was formerly dried on the underdrained beds (663 tons). This is in contrast with the original practice in which the Field Beds yielded only about half the tonnage of dried digested sludge as did the underdrained sand beds.

The contractor who purchases the digested sludge at the Districts' Disposal Plant also buys and removes

Filling "Field Bed" with Digested Sludge
Depth Applied is 2 to 3.5 Feet Depending Upon Weather.

digested sludge from underdrained sand beds of conventional type at the Terminal Island Sewage Treatment Plant of the City of Los Angeles. In 1949 his cost for the removal of sludge from the Terminal Island drying beds was $3.00 per ton, while in the same year his cost to dry and remove sludge from the Districts' Field Beds averaged $1.25 per ton.

Since 1937 the Districts have used only the Field Beds for drying and, hence, have no verified District costs for underdrained bed drying since that time. The Districts' cost in 1934 for underdrained sludge bed drying was $2.75 per ton and in view of other increased costs since that time it seems fair to assume that the Districts' cost would probably be about twice as much in 1949 as in 1934, or approximately $5.00 per ton. The Districts' cost of operation on the Field Beds as of 1949 was 29 cents per ton.

The accompanying tabulation takes into account all cost factors involved in the comparison of underdrained and Field Bed operation. The slight difference in acreage requirements does not materially influence the results and, for the purpose of comparison, each type of bed is presumed to yield the same amount of dry material.

The amount of sludge (dry weight) removed from the Field Beds averages 10 per cent less than the dry solids applied. This is in line with the Districts' investigations which indicate that for the type of sludge applied to the Field Beds at the Districts' plan (53 per cent volatile) further digestion and oxidation during the drying period equals just about 10 per cent.

Equating the solids applied, minus those returned with sludge decant liquor and those lost by further digestion and oxidation, to those removed by the contractor, yields the ratio of 698 to 685.

Stirring (Aerating) Partially Dried Sludge on Bed
For This Job, a Small Plow Nosed Crawler-Tractor Is Used.

Portions of the Field Beds lie within 1000 feet of a public grammar scrool, a restaurant, a super market, and a residential district. No odor or house fly nuisance has resulted from this close proximity to places of habitation except that in 1946 Psychoda flies developed in large numbers making it necessary to spray the beds with D.D.T. The beds are now sprayed with a 5 per cent D.D.T. solution once a year and no further development of filter flies has resulted. It is of especial interest to note that no fly or odor nuisance developed during 1948 when sludge with as much as 200 ppm. of volatile acids was spread on the Field Beds.

Summary and Conclusions

A.—The data obtained on operational sludge drying beds in use at this plant showed that underdrained sand beds and lagoon type Field Beds have similar drying efficiencies. Thus, over a four year period, ending in 1934, the sand beds dried 663 tons per acre per year while during 1949 the Field Beds dried 685 tons per acre per year.

B.—The method of operation used on the Field Beds at the Districts' plant is probably the major reason for the high efficiency. The thorough decantation of the supernatant liquor, followed by mixing of the sludge to accelerate the rate of evaporation, is apparently as efficient as underdraining and subsequent evaporation.

C.—Mixing, or turning, of the sludge by crawler tractor to accelerate evaporation is possible on Field Beds without damaging the bed. On the sand beds, however, such mixing badly disturbs the bed surfaces and causes excessive amounts of sand to be picked up with the sludge.

D.—The overall cost of construction, operation and maintenance of underdrained sand beds for drying and removing the Districts' digested sludge is about five times as great as the same cost for Field Beds.

	Capacity tons/acre/year	Land Needed	Construction cost/acre	Operation Cost Per Ton of Dried Digested Sludge: Dist. Cost	Constr. Cost	Total Oper. Cost
Sand Beds (Underdrained)	663	29.5 acres	$7,500	$5.00	$3.00	$8.00
Field Beds	685	28.5 acres	1,000	0.29	1.25	1.54

G. H. Buck Heads Hackensack Water Co.

George H. Buck, senior member of the firm of Buck, Seifert and Jost, Cons. Engrs., New York City, has been elected president and a director of the Hackensack Water Co. In his new capacity, Mr. Buck succeeds Henry L. deForest, president of the company for the last fourteen years. Mr. deForest will continue as a director and as Counsel and Vice President. Mr. Buck follows in the footsteps of Nicholas S. Hill, Jr., who was president of the Hackensack Water Co. and who founded the consulting engineering firm now headed by Mr. Buck.

Mr. Buck will continue his association with the firm of Buck, Seifert & Jost who have been consulting engineers to the Hackensack Water Co. for many years.

Statistics Show

Statistics show that skinny people live longer, and suffer fewer maladies than fat ones. That's not hard to explain—even a "germ" likes a little meat on the bone.

HOW BRITAIN GLAMORIZES SEWAGE TREATMENT

Some Publicity Releases on Her Most Important Treatment Works

IT hardly needs saying that we were considerably impressed and also highly pleased to receive a number of exceptional photographs distributed by the British Information Services for the purpose of interesting the public in sewage treatment in general and, in particular, the great activated sludge plant of the West Middlesex Drainage Undertaking, which plant is located at Mogden, England.

From the lot of excellent and attractive photographs a few have been chosen for reproduction here. We believe that these will serve as an example of what can be done in America, also, to interest the general public in sewage treatment, and remove some of the public's general dislike for anything with the words "sewage" or "sewerage" connected with it.

Captions released with the very printable pictures highlight the story and accomplishments of the West Middlesex Treatment Works at Mogden. They boast the fact that visitors come from points the world over to see "the finest drainage purification works in the world." Here 600,000,000 gallons of sewage is purified daily in a plant costing £5,000,000 when built in 1935. However, the current costs, including capital charges and all operational costs, amount to less than 2 pence per week for each person served by the works. The plant now serving about 1.5 million people is good for 2.0 million, and produces a purified product of better quality than the water of the Thames into which it is discharged. In consequence, fish now abound in the vicinity of the outfall line's discharge into the river.

Joan Visits the Power House

Where she learns that power enough is generated from sludge gas to run the entire Modgen Works, or to supply all power for a city of 10,000 population—the annual savings from this power being £50,000 per year.

A Study in Sewage Treatment—and Other Considerations

The photographer who posed this picture of Sister Agnes Bennett and her two student nurses, taking samples of the Mogden Treatment Works effluent for laboratory examination, knew his business. The person who conceived of this pattern for increasing public interest in sewage treatment knew his business also.

One caption emphasizes the fact that it is not all outgo and no income from the Mogden Works, by impressing the public with the fact that methane gas, produced in the anaerobic process of converting dangerous sewage solids into safe and usable fertilizer, is recovered in the amount of £50,000 worth annually. So valuable is this by-product gas that Diesel type gas engines operated with it supply power enough to run the entire plant without the need for purchasing any outside power whatever for operating the pumps, air blowers or equipment, including automobiles and trucks of the undertaking. The next most valuable by-product is the fertilizer produced from the digested sludge, and sold to farmers, the present demand for which exceeds the supply of this innocuous natural organic fertilizer.

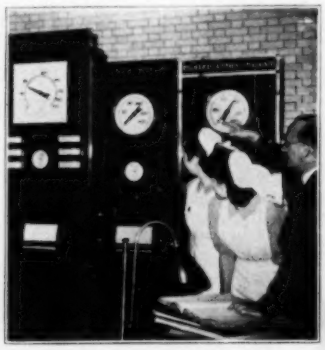
Many scientists and students visit the Mogden Works, concerning which Chief Engineer G. A. Keep remarks "Yes, we have to keep reminding visitors that this *is* a sewage works.

On the other hand, if there should be a bit of a smell now and again one must recall that there is a reason."

The series of photographs take the observer through the Mogden plant with Sister Agnes Bennett and her two attractive brunette and blonde student nurses, Joan Grey and Janet Lourie, who are learning about sewage treatment as a part of their course in General Hygiene at the South Middlsex Fever Hospital.

Chief Engineer G. A. Keep Poses With Teacher and Students

From South Middlesex Fever Hospital came Sister Agnes Bennett and two student nurses in hygiene, Joan Grey (left) and Janet Lourie, to study sewage treatment.



"The Mystery of the Dials"

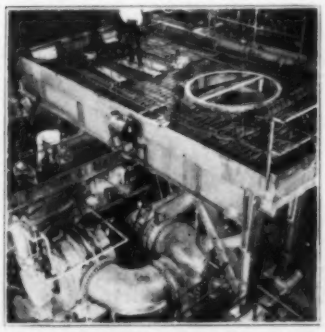
Here Chief Engr. Keep is explaining the mystery of the gage dials, and what each tells the plant control engineers.

PITTSBURGH TO HAVE FLOOD PROOF WATER WORKS PUMP

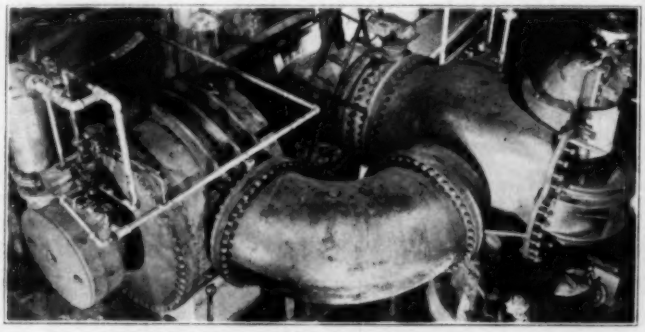
The city of Pittsburgh is now installing a new low service pump to deliver 100 mgd. of river water to the filtration plant regardless of the condition of the river. The pump is a DeLaval single stage centrifugal 12 ft. 1½ in. in diameter with a speed of 327 rpm. The pump suction is 54 in. in dia. and the discharge is 48 in. Total Dynamic Head is 58 ft. of which 15 ft. is suction lift.

The new pump being installed at the Ross Pumping Sta. on the Allegheny River will be powered by a 1250 hp. synchronous motor placed on a reinforced concrete platform over the pump. The platform elevation is above the maximum flood stage reached in 1936, and it is therefore expected that the motor will be above any future flood of the river.

The Ross Station is the only raw water pumping plant in the Pittsburgh water works system and supplies water to the Aspinwall Filtration Plant about a quarter of a mile distant. The current project is part of a modernization plan of the Pittsburgh Water Department.



Form for motor foundation



Close-up of 100 mgd. pump
(note cone valve on discharge)

N.Y.U. Holds Course for Sewage Operators

A special course for Grade II (N.Y. State) Sewage Treatment Plant Operators was given at New York University during the two week period beginning June 19. The course, which was under the direction of William T. Ingram, Assoc. Prof. of Public Health, was presented in cooperation with the Municipal Training Institute of New York State.

The two week program included classroom and laboratory instruction in the techniques of sewage treatment and was designed to provide operators of sewage plants with fundamental knowledge of theory and practice in their field. One third of the time was spent in the laboratory and two-thirds in the classroom. The course covered sedimentation, trickling filters, chlorination, sludge digestion, activated sludge, pumping, stream standards, and laboratory control tests.

Prior to the war a number of these courses were held in cooperation with the State Health Department and several universities. This is the first such course held since before the war.

ANALYTICAL PROCEDURES FOR INDUSTRIAL WASTES*

by

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IN this discussion of the analysis of industrial wastes, consideration will be given to the over-all problems involved. There will be no elaboration of the details of any particular sampling, compositing or analytical procedure, or programming of the approach to any specific problem. Essentially, this article will be concerned with the logic and reasoning behind the selection and application of analyses for evaluation of the sanitary importance of a particular waste.

Analytical Procedures Classified

The analytical procedures which may be applied to industrial wastes may be divided roughly into three categories:

(1) The general sanitary criteria developed for the measurement and control of sewage treatment processes.

(2) Procedures established as an integral part of stream standards.

(3) Chemical procedures especially designed to fit a particular industrial waste.

In addition to these tests, an industrial waste may require special biological examination such as:

(1) Biological assay for toxicity to aquatic life, particularly studies of the toxicity of a waste to fish, or the food organisms which make fish life possible.

(2) Biological assay designed to evaluate the possible deleterious effect of a waste on sewage disposal processes or stream purification.

Such specialized biological assay is important, but comments here will of necessity be limited to consideration of the first grouping of tests presented.

As background for elaboration of the testing of industrial wastes, it would be well to make some classification of industrial wastes. One of the many possible classification schemes is presented in Table I. The classification presented is to some extent arranged on the basis of the appropriate analytical approach. The relationship of the grouping presented to suitable analytical tecniques will develop as this discussion proceeds.

General Sanitary Criteria

The term, "general sanitary criteria," has been devised to designate the long established parameters so generally use in the control of sewage treatment processes and as measures of the sanitary condition of streams.

These include biochemical oxygen demand (B.O.D.), oxygen consumed (or chemical oxygen demand), nitrogen in various forms, the various determinations of solids and volatile matter, and alkalinity or acidity along with pH, temperature, dissolved oxygen, etc.

In general, these values will adequately describe the sanitary significance of food processing wastes (Group IV-b) and will, with minor modification serve to characterize the wastes listed in Group IV-a.

Relation of C.O.D. to B.O.D.

Frequently, the relationship of the B.O.D. test to the chemical oxygen demand value or C.O.D. is not appreciated. It might be well to point out that these two values are complementary. In general, neither determination can be substituted for the other. The B.O.D. test is essentially a biological assay. It measures the amount of material in a medium which can be oxidized by biochemical agencies under stipulated conditions. On the other hand, the chemical oxygen demand test is a strictly chemical oxidation carried out under rigidly specified conditions.

There are a number of chemical oxygen demand tests which are in use. Many more have been proposed. A group of these tests is now undergoing evaluation by a Standard Methods committee of the Federation of

Table I

TYPES OF INDUSTRIAL WASTES

A. Wastes Principally Mineral in Nature
  1. Brine wastes
  2. Mine drainage
  3. Waste slurries
  4. Mineral washing slurries and suspensions
  5. Pickle liquor wastes
  6. Plating wastes
  7. Miscellaneous wastes from inorganic chemical manufacture
B. Wastes that Contain Principally Organic Materials
  I. Hydrocarbon Wastes
    1. Oil Wells
    2. Petroleum refineries
    3. Styrene manufacturing plants
    4. Copolymer rubber plants
    5. Butadiene manufacturing plants
    6. Natural rubber processing or reclaiming
    7. Gasoline filling stations, bulk stations, garages, etc.
  II. Miscellaneous Organic Chemical Wastes
    8. Munitions plants such as T.N.T. tetryl and ammonium picrate manufacture
    9. Pharmaceuticals (Synthetic)
    10. Synthetic fiber plants such as viscose or nylon
    11. Organic chemical manufacture
  III. Phenolic Wastes
    12. Gas plants
    13. By-product coke plants
    14. Chemical plants
    15. Synthetic resin plants (phenol resins)
    16. Tar, road oil and creosoting plants
    17. Wood distillation plants
    18. Dye manufacturing plants
  IV. Biological Wastes
    a. Wastes from processing biological materials and/or from biological processes
      19. Tanneries
      20. Pharmaceuticals (Antibiotics, Biologicals)
      21. Alcohol Industries (Breweries and Distilleries)
      22. Miscellaneous fermentation industries
      23. Glue and gelatin plants
      24. Wool scouring
      25. Textile manufacture
      26. Paper manufacture, particularly sulfite pulp and Kraft mills
      27. Laundry wastes
    b. Food processing wastes
      28. Canneries
      29. Meat packing
      30. Milk and dairy products plants
      31. Corn products plants
      32. Beet sugar plants
      33. Cane sugar plants
      34. Fish processing plants
      35. Other food processing and dehydration plants

*Presented before Industrial Waste and Stream Pollution Symposium in conjunction with Second Gulf Coast Regional Conference on Industrial Health and here published by permission.

Sewage Works Assns. Without exception, every C.O.D. test is a chemical oxidation made according to a fixed procedure.

Occasionally an enthusiastic chemist, after devising a new or improved C.O.D. method, decides that his procedure gives the same information as is yielded by a B.O.D. test. Such a result seems most unlikely. In order for a C.O.D. test to be the equivalent of a B.O.D. test, it must show nearly perfect correlation with the B.O.D. test.

Recently Moore, et al,[1] in evaluating a chemical oxygen demand procedure, studied the oxidation of a group of representative chemical compounds. This sort of work would represent one phase of the demonstration that a C.O.D. test is the equivalent of a B.O.D. test. With data such as are described above, it would be necessary to establish that all compounds chemically oxidized are also biologically oxidized and that no compound is chemically attacked which is not also biologically oxidized. The development of a C.O.D. test having such characteristics does not seem probable.

As an example, acetates and saturated straight chain fatty acids show a high degree of resistance to chemical oxidation, yet they are readily oxidized by microorganisms. On the other hand, cellulose, to cite one example, is most resistant to microorganisms in aerobic systems, yet it readily undergoes chemical oxidation. With these two common materials as criteria, any of the C.O.D. tests proposed to date can be classified as definitely not the equivalent of a B.O.D. test.

However, because there is frequently some correlation between a C.O.D. test and the B.O.D. test, the former has a definite sphere of usefulness. The advantages of the C.O.D. test may be delineated as follows:

(1) It can be used to secure results rapidly.

(a) In some cases it may serve as a guide in selecting appropriate dilutions for B.O.D. tests.

(2) It may be used as an index on wastes containing toxic materials which cannot be satisfactorily examined by the B.O.D. test.

(3) In some cases, where equipment and necessary material for the B.O.D. test are not available, the use of a C.O.D. test may be necessary.

(4) On certain chemical wastes, the C.O.D. test is perhaps the best parameter available to measure the amount of material being discharged.

Applicability of Usual Tests

The general sanitary criteria frequently are not well adapted to characterizing a waste. It would obviously be useless to run B.O.D., nitrogen values or the like on most of the mineral wastes listed in Group "A", Table I. These materials can best be evaluated in terms of pH, acidity or alkalinity, solids and the determination of definite mineral constituents.

A group of determinations or examinations which may be arbitrarily applied to industrial wastes are those procedures which are stipulated as an integral part of stream standards. When definite limits for the amounts or concentrations of certain materials which may be discharged are established, it is a practical administrative measure to specify in detail the means which shall be used to determine whether or not a waste conforms to the established standard.

Further, the procedure specified actually becomes a definitive part of the standard. For instance, it would be possible to debate at great length regarding what constitutes "oil" in a waste. However, when a procedure for the determination of oil is adopted as part of a standard, the procedure so adopted serves as a clear definition of oil. For the purpose of interpreting the standard, oil is that material which is measured as oil by the procedure stipulated.

Stream Standards and Tests

In reaching agreement on methods designed to become a part of stream standards, a perplexing problem frequently occurs. This is the difficulty which arises in trying to make a practical compromise between those methods or procedures which most closely approach technical perfection, and methods which can be carried out at reasonable cost. It is obviously undesirable to stipulate any method which the parties concerned cannot afford to use, either because of an excessive requirement in the way of man hours and laboratory space per determination, or because very expensive and highly specialized equipment is required.

In the tentative concentrations listed by the International Joint Commission as "Objectives for Boundary Waters Quality Control"[2] definite limits were established for the amount of certain materials which might be discharged. Many of the techniques prescribed for interpretation of the "Objectives" represent not the best procedure available, but the best procedure which it was deemed feasible to specify.

Under this heading of arbitrary procedures, as an example, the International Joint Commission[2] tentatively prescribed methods for phenolic material, pH, iron, and oil, as part of their "Objectives for Boundary Waters Quality Control". While some of these are determinations which have been designated at the general sanitary criteria, they assume a definite identity as part of a quality standard for wastes.

Establish Examination Purpose

Finally, it is necessary to select or develop analyses designed to best characterize a particular waste. There are no inclusive simple rules which may be laid down for choosing the right group of analytical determinations to use. The experience, judgment, and "know-how" of the personnel involved must be used to the fullest extent.

Before undertaking the examination of most industrial wastes, the goal or purpose of the examination should be clearly established. Thus, one series of determinations might be pertinent if a given waste is suspected of causing taste and odor difficulties, a second group would be applicable if the waste is being considered as a possible contributor to a serious oxygen sag, and a third group of determinations might best be used if the waste is believed to be a source of toxic metals or cyanides.

The value of the establishment of objectives in connection with the analyses of industrial wastes cannot be over emphasized. Once the objectives of the examination are thoroughly understood, the analyses have a definite goal. It is then possible to lay out a compact analytical program which will secure the significant data. Also, it is easy to avoid making an expensive collection if irrelevant determinations.

For example, the significant chemical criteria in the case of a metal plating waste believed to have killed fish are likely to be cyanide, toxic metals and possibly acidity or alkalinity. In the case of a milk processing plant being gaged as a stream load factor, the general sanitary criteria will evaluate the waste. In the case of a waste being considered as a source of phenolic materials, and as a factor in a stream oxygen sag, phenol, C.O.D., and B.O.D. along with some other specialized tests may be sufficient. The fluoride determination, which is rarely applied to industrial wastes, would be a key determination in the examination of fluoridation wastes, or processes involving the use of hydrofluoric acid.

In the case of the example cited, the proper analytical approach has been fairly obvious. This is not always the situation. There is no substitute for experience in designing a procedure for the examination of industrial wastes in connection with a particular situation.

Problems of Specific Tests

After the objectives of the examination of an industrial waste are fixed, it must be recognized that the task which remains is likely to be a research problem of some magnitude. Analytical methods have an unfortunate tendency to break down when applied to industrial wastes. This is especially true when it is desired to determine a definite component of the waste. When one particular material is involved, it is frequently advisable to take steps to see if the procedure used actually did work.

Suppose it is desired to determine the amount of cyanide present in a given waste sample. First, the method to be used is selected and the determination carried out. Then, as a check on the efficiency of the applied method, a definite amount of cyanide is added to the waste, and a second cyanide determination is made. Unless the difference in the two values obtained is approximately equal to the amount of cyanide added, there is good reason to doubt the method used.

For instance, if (1) analytical results indicate 100 ppm. of cyanide to be present in a given waste and (2) 100 ppm. of cyanide are added to a portion of the waste and the fortified portion is analyzed, using the previously applied procedure, the value obtained should be about 200 ppm. In the situation just cited, if the second cyanide determination had shown 120 ppm. of cyanide present, there would be every reason to reconsider the applicability of the technique used. No analytical method can ever be considered satisfactory unless it will consistently show recovery of a very high percentage of an added amount of the material which it is desired to determine.

No attempt will be made to describe means for determining the presence of materials which give a positive interference with an analytical method applied to an industrial waste. Such a discussion is beyond the scope of this paper. However, one point cannot be over emphasized—continued skeptical evaluation of analytical procedures is a "must" if reliable results are to be obtained.

Summary

1. The regular laboratory procedures which may be applied to industrial wastes consist of:

(a) The general sanitary procedures, (b) Procedures established as an integral part of standards; and (c) Procedures specifically designed to gain desired information concerning a particular waste.

2. The successful application of analytical techniques to industrial wastes requires:

(a) Establishment of the purposes to be served by the information to be obtained; (b) Careful specification of the determinations to be made and the procedures to be followed, and (c) Repeated examinations of the efficiency of analytical procedures to insure that the analytical values are reliable.

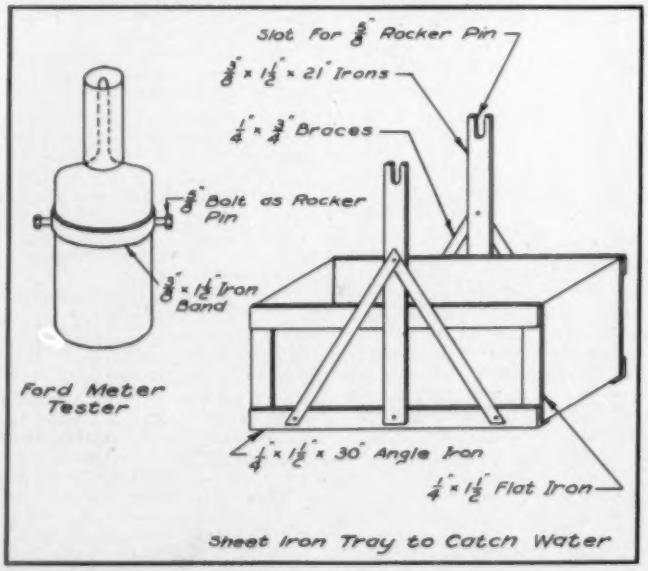
References

(1) Moore, W. A., Kroner, R. C., and Ruchhoft, C. C. "Dichromate Reflux Method for determination of Oxygen Consumed," Anal. Chem., 21, 953-7 (1949).

(2) Board of Technical Advisers, International Joint Commission Boundary Waters Pollution Investigation. "Objectives for Boundary Water Quality Control." (1948) Public Health Service. Mimeograph.

(3) Board of Technical Advisers, International Joint Commission Boundary Waters Pollution Investigation. "Analytical Methods for Boundary Waters Control." April 1948. Public Health Service. Mimeograph.

CRADLE FOR FORD METER TESTER*


Slot For ⅜" Rocker Pin
⅜" x 1½" x 21" Irons
¼" x ¾" Braces
⅜" Bolt as Rocker Pin
⅜" x 1½" Iron Band
Ford Meter Tester
¼" x 1½" x 30" Angle Iron
¼" x 1½" Flat Iron
Sheet Iron Tray to Catch Water

The device sketched is a handy cradle for a Ford Meter Tester that can be built in any shop. It simplifies the emptying of the can after completing a test. Just turn the can over and when empty it rocks back into position ready for another test. The tray is to prevent splash or spatter.

(*Contributed by Vester Opie, Supt., Milan, Mo.)

Metr. Sect. NYSIWA Hears About Sludge Barging

The Metropolitan Section of the New York Sewage & Industrial Wastes Assn. held its last spring meeting on May 23 following the dedication of the New Owls Head Pollution Abatement Project in New York City.

The topic for the evening was "Sludge Disposal at Sea". Two papers were presented. Leslie West, Chief Engineer, Joint Meeting of Essex and Union Counties, N.J. spoke on "Current Practices of the Joint Meeting in Sludge Concentration and its Disposal at Sea."

Nathan Kass, Chief, Bureau of Sewage Disposal Operation, Dept. of Public Works, City of New York, presented a paper titled, "Most of New York City's Sludge Dumped at Sea". Slides were shown in connection with both talks.

THE CAPACITY OF SEWAGE PUMPING STATION SUCTION WELLS

by

C. E. KEEFER
Deputy Sewerage Engineer
BUREAU OF SEWERS
BALTIMORE, MD.

IN the January 27, 1950, issue of *The Surveyor* L. B. Escritt has presented an interesting discussion of the proper design of sewage-pumping station suction wells. Large suction wells not only are expensive but also are conducive to the deposition of sewage solids. The result is a septic sewage and odors. Small wells may result in the frequent starting and stopping of electric motors and be injurious to starting equipment. The starting and stopping of motors occurs least frequently when the rate of flow to a pumping station is either much smaller than or almost as great as the pump capacity.

Escritt has derived a formula which will give the expected time between successive starts of a sewage pump in which:

t = time in minutes between successive starts.
P = delivery of pump in cu. ft. per min.
C_1 = effective capacity of suction well, between cut-in and cut-out levels, in cu. ft.
Q = rate of inflow, in cu. ft. per min.

The time between successive starts is made up of filling time plus emptying time.

$$\text{The filling time} = \frac{C_1}{Q}, \text{ and}$$

$$\text{the emptying time} = \frac{C_1}{P-Q}$$

$$\text{then } t = \frac{C_1}{Q} + \frac{C}{P-Q} \qquad (1)$$

$$\text{and } C_1 = tQ - \frac{tQ^2}{P} \qquad (2)$$

The most frequent starting and stopping occurs when the rate of inflow equals one half the rate of outflow. This statement can be proved as follows:

$$y = \frac{P}{2} - Q$$

When y is substituted in equation (1)

$$t = \frac{C_1}{\frac{P}{2} - y} + \frac{C_1}{\frac{P}{2} + y}$$

$$= \frac{C_1 P}{\left[\frac{P}{2} - y\right]\left[\frac{P}{2} + y\right]}$$

$$= \frac{C_1 P}{\frac{P^2}{4} - y^2}$$

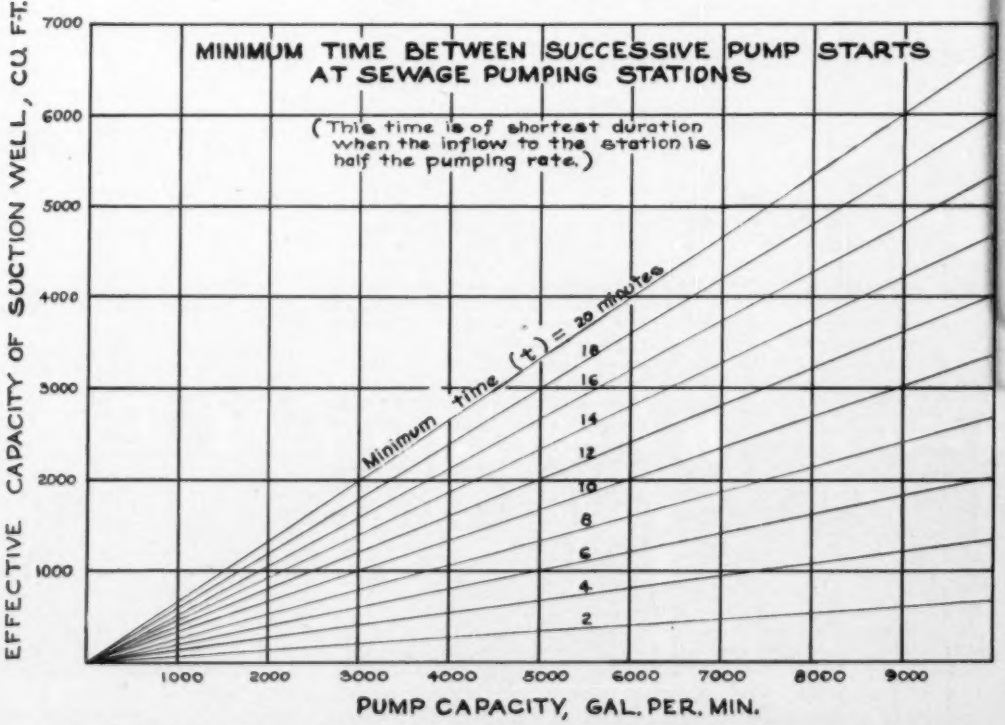


Chart for Determining the Effective Capacity of a Suction Well and the Minimum Time Between Successive Starts of Pumps

It is obvious that t is a minimum when $y = 0$; and when $y = 0$, the rate of inflow equals one half the rate of outflow. Under these conditions

$$t = \frac{C_1 P}{\frac{P^2}{4} - 0}$$

$$= \frac{4C_1}{P}$$

$$\text{and } C_1 = \frac{tP}{4} \qquad (3)$$

Where the sewage backs up in the incoming sewer, the value of C_1 will be increased by the volume of the sewer, included between the cut-in and the cut-out levels of the sewage.

The accompanying chart which has been prepared by the writer, based upon the above formulae, can be used to determine the effective capacity of a suction well. For example: if a sewage pump has a capacity of 6,000 gal. per minute and it decided that the minimum time between successive starts of the pump, (that is when the flow to the station is 3,000 gal. per min.) is to be 10 minutes, the effective capacity of the suction well between cut-in and cut-out levels should be 2,000 cu. ft.

The chart can also be used to determine the minimum time between successive starts of a pump at existing pumping stations. Let it be assumed that a pumping station is provided with two 7,000-gal. per min. pumps, one of which is a spare and that the effective capacity of the suction well is 1,400 cu. ft.; by referring to the chart the minimum time between starts is found to be 6 minutes.

Equation 3 and the accompanying chart should be helpful in determining the effective capacity of sewage pumping station suction wells. After the capacity of the pumps is determined and the types of motors and electric starting equipment are selected, the minimum time between successive starts should be decided upon. The effective capacity of the suction well can then be determined.

POLLUTION ABATEMENT BEING PUSHED VIGOROUSLY IN NEW YORK STATE

An accelerated attack on water pollution is anticipated as the result of a conference of four state and interstate pollution abatement agencies held on June 1 in New York City.

New York State's Joint Legislative Committee on Interstate Cooperation, of which Assemblyman Harold C. Ostertag is chairman, was the host group at the conference which brought together members of the New England Water Pollution Control Commission; the Interstate Sanitation Commission, embracing the tidal areas of New York, New Jersey and Connecticut; New York State's Water Pollution Control Board, and the Special Committee on Pollution Abatement of the Legislature of N.Y., which functions within the Interstate Committee. The interstate agencies reviewed the status of pollution control activities within their jurisdiction, and New York State's Water Pollution Control Board and the Special Committee on Pollution Abatement, discussed means of intensifying pollution control activities.

Chairman Ostertag pointed out that because of increasingly serious water shortages occurring in various parts of New York State "an intensive program of pollution abatement activities is not only desirable but essential to the conservation of our vital water resources." Further—that, 80% of the people of New York are dependent upon surface waters for domestic water supplies, and in addition hundreds and hundreds of industries need cleaner water for process operations.

N.Y. State's Water Pollution Control Board, created in 1949, is now holding a series of public hearings on proposed water quality standards which, when adopted, will be applied to all the surface waters of the state. Under the terms of the law, the Board has authority to order and enforce conformity with these standards which will be applied to all surface waters classified in accord with their best public use.

The Special Committee on Pollution Abatement of the N.Y. Legislature has named three new subcommittees to study areas in which serious problems in pollution exist, with a view to formulating proposals to overcome them. One of these is the subcommittee on fiscal problems which has been set up to study the feasibility of sewer rentals as a means of financing needed sewer systems and sewage treatment works. In this connection, Chairman Ostertag pointed out that a proposed constitutional amendment, submitted on recommendation of the Special Committee on Pollution Abatement and approved by the 1950 session of the legislature, will, if ratified by the voters, expedite the construction by municipalities of sewage treatment works, by providing that if they are demonstrably self-sustaining financially, they can be constructed in part outside municipal debt limits. Sewer rentals, such as are now in use in many states, will be explored as a means of making such projects self-sustaining.

Another subcommittee will seek means of insuring that municipal planning takes into account the need for sewers and sewage treatment works and does not sidetrack these facilities in favor of more popular municipal outlays. A third subcommittee is investigating the problem of disposition of industrial wastes, with two objectives: first, to inventory existing means of treating industrial wastes and, wherever possible, convert them into profitable by-products; second, to analyze industry's fiscal problems with regard to waste treatment. In this connection the subcommittee will also study various measures of possible tax relief designed to encourage elimination of industrial pollution on an economically feasible basis.

Studies of the Special Committee show that almost 300 New York State communities, ranging from hamlets to cities, need sewers and/or sewage treatment plants, and that the cost of eliminating the untreated wastes, now pouring into surface waters at the rate of approximately one billion gallons daily, will be upwards of $400,000,000. Further, because of the high degree of industrialization of the State, a problem of even greater magnitude exists with regard to elimination of industrial pollution.

In addition to the Water Pollution Control law, the Ostertag Committee has sponsored legislation for the past several years under which municipalities which need sewers or sewage treatment plants may get state planning aid up to two percent of the cost of the project.

The Special Committee on Pollution Abatement is headed by Senator Chauncey B. Hammond of Elmira, New York, who is also acting as chairman of the new Subcommittee on Industrial Waste Problems. Senator Floyd Anderson, of Binghampton, is chairman of the new Subcommittee on Planning, and Assemblyman Elisha Barrett, of Bay Shore, L.I., is chairman of the Subcommittee on Fiscal Problems.

UNDERGROUND WATER POLLUTION ABATEMENT IN LOS ANGELES

Special Tools for Special Work

by
JOHN H. ASHLEY
Industrial Waste Engineer
SEWER MAINTENANCE DIVISION
LOS ANGELES, CALIF.

THE successful use of the Bulkley, Dunton Pulp Co. Colloidair Separator to clarify the Santa Fe Railway Co. industrial waste to meet the strict standards of quality demanded by the City of Los Angeles for a permit to discharge into the Los Angeles River will come as a pleasant surprise to those who are interested in the subject.

The famous playwright Richard Brinsley Sheridan is credited with the observation that sheer necessity is the proper parent of an art so nearly allied to invention. The unalterable truth of this statement has been recently very forcibly and factually demonstrated here in the City of Los Angeles, where the prevention and correction of underground and surface water pollution is, and will continue to be, a project of the first magnitude.

In order for the reader to properly appreciate the problem involved, it should be noted that the Los Angeles River flows in a paved channel through the heart of the metropolitan area, but that shortly thereafter it debouches onto and into an unpaved sandy gravel bottom, where much of it is received into the underground storage basins. It is from these underground reservoirs that several private and municipal water companies draw drinking water supplies for the use of small communities in the southeasterly portion of the greater Los Angeles area.

It should be expected that the City of Los Angeles could not and would not stand idly by while the drinking water of its neighboring communities was in actual or potential danger of contamination from harmful industrial wastes originating within its jurisdiction, and such is indeed the case. The Board of Public Works authorized the creation of an Industrial Waste Advisory Committee, whose function should be to closely scrutinize all proposed and existing waste discharges into the river and other channels as well as into storm drains tributary thereto. This committee adopted a standard of quality for discharge of liquid industrial waste into the Los Angeles River which was designed to be adequately stringent to insure protection of the underground water supplies and at the same time sufficiently generous to permit and encourage industry to cope with and overcome their own waste problems.

This standard for discharge into the paved section of the river downstream from the Riverside-Dayton Bridge is as follows:

Substance	ppm.
Suspended Solids (not to exceed 60% volatile)	100
Petroleum Oil	None
Other Oil, Grease, or Soap	25
Caustic Alkalinity	100
5-Day B.O.D.	20
pH	5.5 to 9.0
Color	40
Putrescible Matter	None
Sulphide	1
Gums, lacquers, solvents, hydrocarbons; other flammable substances	None
Cyanides, phenols, chromates; other toxic substances	None
Salts of Heavy Metals Not to exceed U.S.P.H.S. standard	
Except as otherwise specified not to exceed four times the United States Public Health Service allowable limits for drinking water.	

This is the standard required by the Industrial Waste Control Section of the Sewer Maintenance Division in granting industrial waste permits and in correcting existing violations.

This article on water pollution in the City of Los Angeles by John H. Ashley, Industrial Waste Engineer in the Sewer Maintenance Div., expresses the fine cooperation and coordination and enforcement practiced in the City of Los Angeles.

The enforcement of Industrial Waste rules and regulations requires a give-and-take attitude on the part of business, industry, and government officials. It has been the policy of the industrial waste engineer to work with industries in helping them to solve their problems.

The article herewith shows this type of work, in which 100 per cent cooperation and coordination were given by both parties over a period of time. Only by such effort can the problems of Industrial Waste discharge into streams, rivers, and underground water ever be solved—by working together and serving together for the betterment of the community.

Reuben F. Brown, Supt.
Sewer Maintenance and Operation
Los Angeles, Calif.

Settling Ponds Where Most of Free Oil and Sludge Are Removed

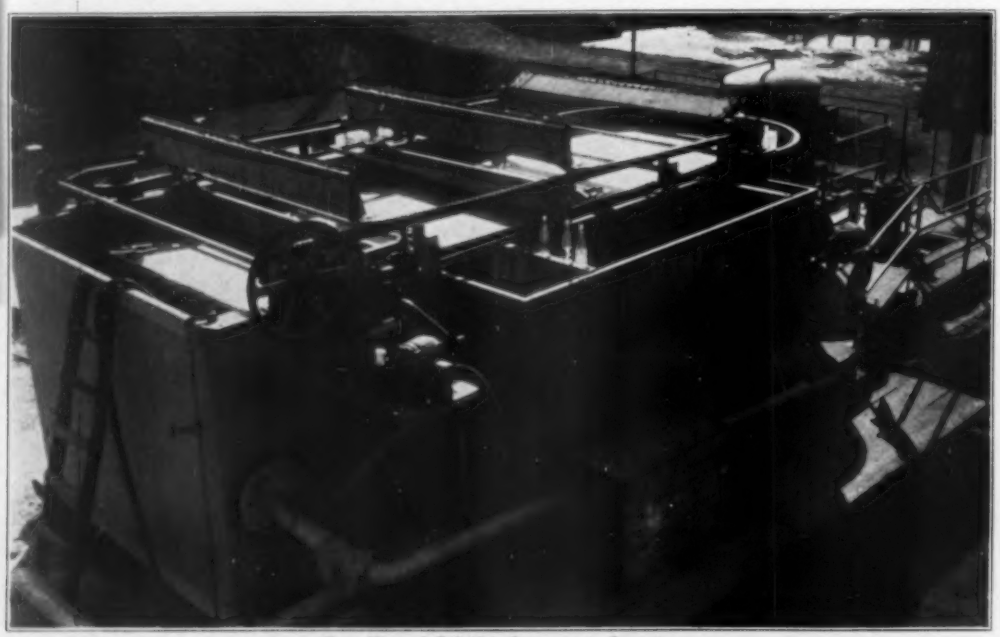
(Left—Battery of three ponds; Center—Primary settling pond to which wastes are discharged; Right—Middle pond to which oil laden floc from separator is returned.)

Final Settling Pond from Which Waste Water Containing 400 to 500 ppm. of Oil Is Pumped to Colloidair Separator Shown in Center
(Tank car washing facility is in background.)

Two years ago the City notified Santa Fe Railway officials that they were expected to "clean up" their industrial discharge into the river. This waste, the composition and quantity of which varies from time to time, comes from three principal sources,—namely, round house and shop operations, train washing, and tank car washing.

One of the principal items for correction was the removal from the waste water of large quantities of free and emulsified oil. The customary gravity-differential separation methods were tried and found wanting. The Company's officialdom threw everything into the solution of the problem,—Money, research, testing, pilot plant studies, etc.,—but with only indifferent success. Then IT HAPPENED! A Bulkley, Dunton Colloidair Separator was installed and placed in operation upon a trial basis. There were relatively few days spent in experimentation with different flocculents, and then the amazing result of 0 ppm. of grease and oil and 26 ppm. of suspended solids was achieved in the final effluent,—and this from a waste containing in excess of 5000 and 7000 ppm. respectively of these two items.

If you have read this account thus far, you will want to know how all this was accomplished. Considered mechanically, the process consists of utilizing dissolved air in order to obtain superior flotation. This is done by introducing a proper amount of compressed air, usually 25 to 40 psi., on the discharge side of the pump. Introduction at this point removes the dangers of excess turbulence or agitation in the dwell tank such as would be encountered where entrained or diffused air is employed. Since there is little or no sludge present (note the sumps in the pictures), no bottom flights are needed, and this further insures absence of turbulence in the flotation chamber. Considered chemically, the process consists of formation of a high density suspensoid floc which occurs at



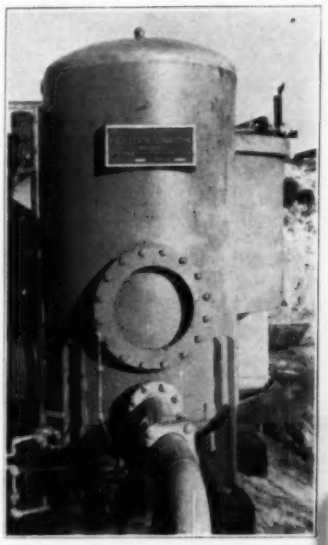
Front View of Colloidair Separator in Operation

Unrehearsed Pose of Author Securing Pictures for Article

the time the dissolved air comes out of solution. The flocculents which were used successfully in this case are activated silica and aluminum sulphate.

In concluding this article, in which every point of interest to the reader could not possibly be covered, the author wishes again to acknowledge the splendid cooperation afforded by the Santa Fe Railway Company through its engineers, Mr. G. L. Davenport, Jr. and Mr. J. C. Paget. He also wishes to acknowledge the long and untiring efforts of Dr. Robert A. Baum, representing the Bulkley, Dunton Pulp Co., Inc., under whose direction, supervision, and experimentation the problem was solved.

The control of industrial waste discharges into sewers, storm drains, and channels in the City of Los Angeles and the issuance of industrial waste permits therefor is a function of the Sewer Maintenance Division of which Reuben F. Brown is Superintendent. This Division is part of the Bureau of Sanitation of which Warren A. Schneider is Waste Disposal Engineer.



Retention Tank Where Air Is Dispersed

Los Angeles Seeking Sewage Treatment Plant Personnel

The new Activated Sludge Plant of Los Angeles, Calif. at Hyperion on the Pacific is rapidly nearing completion. Many positions in connection with the operation and maintenance of this plant are to be filled.

From Lloyd Aldrich, City Engineer of Los Angeles we have a request that we assist in the location of outstanding personnel to operate this plant which will be the largest activated sludge plant ever constructed.

Any interested person who may be available for a position in connection with this great new plant should file with the Civil Service Commission of Los Angeles a copy of his education and experience record. Such records will be reviewed and the persons best qualified will be notified in proper time of the dates of the examinations covering the applicant's specialty. These examinations are usually given in Los Angeles but in certain categories it is probable that examinations will also be given at various points in the United States.

Anyone interested in securing a position in sunny Southern California in connection with the "World's Largest Activated Sludge Plant" should file their qualifications with the Civil Service Commission, Room 5, City Hall, Los Angeles 12, Calif.

CONFERENCE OF STATE SANITARY ENGINEERS

The 30th annual meeting of the Conference of State Sanitary Engineers was held in Washington in mid-May. The meeting was addressed by Dr. W. Palmer Dearing, Acting Surgeon General of the Pub. Health Service; C. W. Klassen, Chief, Div. of San. Engr., Ill. State Dept. of Public Health; L. M. Fisher, Engineering Field Associate of APHA and former secretary of the Conference; B. A. Poole, Dir., Bur. San. Engng., Indiana State Dept. of Health; Carl E. Schwob, Chief, Div. of Water Pollution Control, U.S. Pub. Health Service; P. J. Houser, Dir., Bur. San. Engng., Iowa State Dept. of Health and others.

The Conference elected the following officers: *Chairman*, C. M. Everts, Jr., Dir., Div. Envir. Sanit., Oregon State Bd. of Health; *Vice Chairman*, Earl C. Devendorf, Dir., Div. of Sanit., New York State Dept. of Health; *Secretary-Treas.*, C. H. Atkins, Chief, Div. of Sanit., Public Health Service, Washington.

Johns Hopkins Univ. Studies Clogged Sewer Inlets

The Institute of Cooperative Research of the Johns Hopkins University in Baltimore, Md., has begun the study of clogged and faulty storm water inlet and storm sewers. Dr. J. C. Geyer of the Dept. of San. Engng. is heading up the study. The project calls for the development of improved techniques for the design of inlets and storm sewers and is sponsored jointly by the Baltimore Dept. of Public Works, the Baltimore County Metropolitan District, and the Maryland State Road Commission.

Comments of the Editors

Young Men in the Water Works Industry

It may be recalled by some that the writer, when taking office in 1948 as president of the American Water Works Assn., in his acceptance speech made a special plea for increased recognition of the importance of the young man in the water works industry, and the desirability of making more of a place in the Association for these young men, and developing in them a keener interest therein by seeing that they be put to work on committees. Thereby, the average member age would be reduced, adding virility to the organization, while also doing a very much worthwhile thing in the direction of holding in the water supply industry the most capable and promising young men, too prevalently lost to industry.

It was, consequently, most pleasing to hear Victor Weir, president and general manager of two important water utility companies, in his recent acceptance speech as the new president of the A.W.W.A. stress the desirability, and the urgency, of making the water works industry more attractive to capable and ambitious young men, and setting forth suggested ways and means of so doing.

Amongst other things President Weir had these things to say—

"Are we in the water works industry getting hold of our share of progressive young men? Are we properly training them to solve our problems? Are we selecting, from college and university graduates, the promising individuals to go into our plants and offices for training, as many industrial concerns do? I believe our industry is important enough to warrant a deliberate effort to do just that. I believe our problems can best be solved by following such a course.

There is competition for the most promising of each year's crop of graduates. To purchase a young man's services, it is not enough merely to meet the going salary; the promise of opportunity for advancement must also be given him. The latter is the more important. The young man is going to weigh a future in the water works industry against a future in another field he might enter. Verbal assurance of what he can expect will not impress him greatly. He will want to know what has happened to the men 5, 10, and 20 years out of school now in the water system he is considering. He will gather, by looking at the office, the plant, and the employees, whether he is being asked into a well organized, modern, efficient system where hard work and production are rewarded.

Because WATER is the most basic of all commodities our industry is second to none in importance in the community and possesses a stability not equaled by other industries. These factors should be attractive to any new employee, but an ambitious young man—the kind who will help solve our problems in the future—will be more interested in whether the man who holds the position he would expect to occupy later considers his job challenging and adequately paid. He will want to know that when he becomes superintendent or manager he will be receiving something more than half or two-thirds the salary that a man with similar ability and experience would be getting elsewhere.

There is no valid reason why the water works industry should offer less than does any other industry. Our industry is growing. Eighty million dollars of water works construction contracts have been awarded in less than four months in 1950. This amount averages more than $5,000,000 a week, 85 per cent greater than in 1949. There exists a backlog of planned water works projects totaling 1⅓ billion dollars, enough to support the 1949 rate of activity for 6 years.

As an industry, we have the problem of making our laboratories, offices and plants desirable places in which to work, and the personnel must have adequate salary schedules. Such things require money, and many water utilities will have to raise their system incomes by increases in water rates. Water Departments must compete with industry for these graduates, and salary schedules which may have been set for political appointees are not sufficient.

Getting a promising graduate is only part of the job. He must still be trained in many things which he could not be taught at school. He must acquire the experience which comes from rubbing elbows with many kinds of men. He must learn by doing.

If a young man is to learn the water works business and be an individual you can depend upon to solve problems, he must also know what is going on in other systems. He must know of the improvements being made elsewhere. If he is aware of the mistakes and failures of others, he will be in a better position to prevent them in his own system. He must have an opportunity to read of these happenings, and he should meet and talk to the men who can guide and teach him. These are things which will accelerate the training necessary to make a young man a valuable employee.

An adequate library should be available. Current water works periodicals should be given him and time should be provided so that he may read them. The young man should be made to feel that he is part of an industry which is active and progressive. Membership in the Am. Water Works Assn. will give him a sense of belonging, professionally, and the Journal will challenge and educate him. The cost will be less than 0.5 per cent of his wages, an amount any employer should be glad to pay, since the returns in employee value will be several times the expense. If I were to be asked what single thing helped me the most in my water works career, the answer would be that as a cub engineer, less than a year out of school, I was sent from St. Louis to the Annual AWWA Convention in New York.

It will not be possible for many new employees to go to the annual conventions, but every effort should be made to have them attend the section meetings. They will meet on easy terms the men who can help them in their careers. The discussions in and out of the meeting rooms will give them the experience of others. No better way exists to more speedily make an employee valuable.

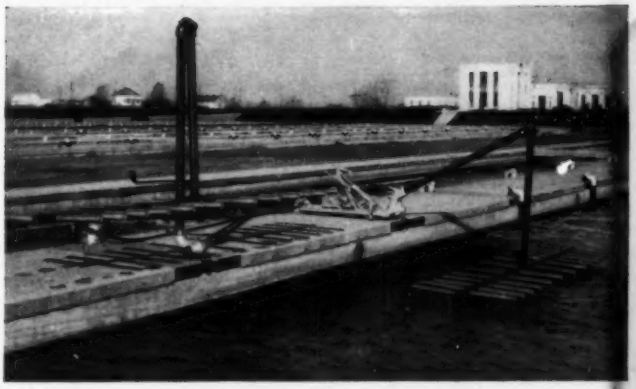
If I could talk to an audience of young water works engineers, accountants and bacteriologists who were not members of the Association, it would not be difficult to show them that the A.W.W.A. membership dues are a small price for being part of the active, growing, professional organization in the field of their work. The Association can give them assistance which, as they develop, should return the $10.00 dues per year many times in salary increases.

We need young men, the best obtainable, in our water works organizations. We must meet the competition of other industries in the matter of wages and advancement, for these are the men we want to do our work in the future, and to do it better than we do it today."

We think that these words from a man who has so relatively young in life attained the positions which he holds in the water works industry deserve the widest possible repetition and circulation. Knowing, as we do, that "Vic" Weir is one who "practices as he preaches" and, also, that he is the exemplification of those "young men" of whom he speaks, it is a privilege to devote this page to his sage recommendations.

L. H. Enslow

THE OVERWHELMING MAJORITY *specified* "CHICAGO" SWING DIFFUSERS AND PRECISION TUBES



Sewage Treatment Plant
Columbus, Ohio

Paul A. Uhlmann & Associates
ENGINEERS

THE overwhelming majority of Consulting and Design Engineers who planned equipment for Activated Sludge Sewage Treatment Plants in the past five years specified CHICAGO Swing Diffusers and Precision Diffuser Tubes. It's a question of "Diffused Air Economics". Continuous operation of an Aeration Battery is possible only with Swing Diffusers. The most economical operation is possible with Precision Diffuser Tubes.

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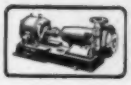

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MEETINGS SCHEDULED

JULY 6-8—BLACKSBURG, VA. (Virginia Polytechnic Institute)
Virginia Water Works School. Director, James A. Rives, Dept. Civil Engineering, Virginia Polytechnic Institute, Blacksburg, Va.

AUG. 9—MT. DESERT ISLAND, ME.
Maine Water Utilities Assn. (Summer Meeting (Sec'y, Earle A. Tarr, Supt. Water District, Winthrop, Me.

AUG. 21-23—STATE COLLEGE, PA. (Nittany Lion Inn)
Pennsylvania Water Works Operators Assn. Sec'y, Prof. Robert E. Stiemke, Dept. of Engineering, State College, Pa.

AUG. 23-25—STATE COLLEGE, PA. (Nittany Lion Inn)
Pennsylvania Sewage & Industrial Wastes Assn. Sec'y, B. S. Bush, Penna. Department Health, Kirby Health Center, Wilkes-Barre, Pa.

SEPT. 6-8—ST. PAUL, MINN. (St. Paul Hotel)
Minnsota Section A.W.W.A. Sec'y, R. M. Finch, 518 Metropolitan Life Bldg., Minneapolis, Minn.

SEPT. 7-8—SARANAC LAKE, N. Y. (Saranac Inn)
New York Section A.W.W.A. (Fall Meeting) Sec'y, R. K. Blanchard, 50 West 50th Street, New York, N. Y.

SEPT. 11-13—LAKE OF BAYS, ONTARIO (Big Win Inn).
Canadian Institute of Sewage and Sanitation. Secretary, Dr. A. E. Berry, Parliament Building, Toronto, Ont.

SEPT. 13-14—HUNTINGTON, W. VA. (Hotel Pritchard)
W. Virginia Section A.W.W.A. Secy, J. B. Harrington, State Department of Health, Charleston, W. Va.

SEPT. 14-15—HUNTINGTON, W. Va. (Hotel Pritchard)
West Virginia Sewage and Industrial Wastes Assn. Sec'y, R. G. McCall, Room 643, State Capitol Bldg., Charleston, W. Va.

SEPT. 18-21—POLAND SPRING, ME. (Poland Spring House)
New England Water Works Association. (Annual Convention Sec'y, Joseph C. Knox, 1204 Tremont Bldg., Boston, Mass.

SEPT. 19-21—OSHKOSH, WIS. (Hotel Raulf)
Wisconsin Section A.W.W.A. Sec'y, W. U. Gallaher, Water Department, Appleton, Wisc.

SEPT. 19-21—DAVENPORT, IOWA (Hotel Blackhawk)
Iowa Sewage Works Association. Sec'y, Leo Holtkamp, E. Ohio Street, Webster City, Iowa.

SEPT. 20-22—ATLANTA, GA. (Georgia Institute Technology)
Georgia Water and Sewage School. Sec'y, Van P. Enloe, R.F.D. No. 5, Box 363, Atlanta, Ga.

SEPT. 24-26—CALGARY, ALBERTA (Palliser Hotel)
Western Canada Water and Sewage Conference. Sec'y, H. C. Lindsten, 301 Hamilton Bldg., Winnipeg, Manitoba.

SEPT. 26-29—ATLANTIC CITY, N. J. (Claridge Hotel)
Pennsylvania Water Works Association. Sec'y-Treas., C. M. Hartman, 510 Telegraph Bldg., Harrisburg, Pa.

SEPT. 27-29—SANTA FE, N. M. (LaFonda Hotel).
Rocky Mountain Sewage Works Association. Sec'y, C. H. Coberly, Room 329, 1441 Welton St., Denver, Colo.
Rocky Mountain Section A.W.W.A. Sec'y, Geo. J. Turre, Room 120, City-County Bldg., Denver, Colo.

SEPT. 28-29—COLUMBUS, OHIO (Neil House)
Ohio Section A.W.W.A. Sec'y, L. T. Fawcett, Box 298, Youngstown, Ohio.

OCT. 1-3—ST. LOUIS, MO. (Sheraton Hotel)
Missouri Section A.W.W.A.
Missouri Water & Sewage Conference. Sec'y, Warren Kramer, State Office Bldg., Jefferson City, Mo.

OCT. 9-12—WASHINGTON, D.C. (Statler Hotel)
Federation of Sewage Works Association. Exec.-Sec'y, W. H. Wisely, 325 Illinois Bldg., Champaign, Ill.

MEETINGS SCHEDULED

OCT. 11—WATERVILLE, ME.
Maine Water Utilities Assn. (Marks the 25th Anniversary of founding of the Ass'n.) Sec'y, Earle A. Tarr, Supt. Water District, Winthrop, Me.

OCT. 11-13—MOBILE, ALA. (Battle House Hotel)
Alabama-Mississippi Section A.W.W.A. Sec'y, J. L. Snow, 601 First National Bank Bldg., Montgomery, Ala.

OCT. 15-18—NEW YORK CITY, N.Y. (Hotel New Yorker)
American Public Works Association Congress. Exec. Director, Donald Herrick, 1313 East 60th St., Chicago 37, Ill.

OCT. 15-18—NEW ORLEANS, LA. (Roosevelt Hotel)
Southwest Section A.W.W.A. Sec'y, Leslie A. Jackson, Robinson Memorial Auditorium, Little Rock, Ark.

OCT. 16-18—PITTSBURGH, PA. (Hotel Wm. Penn.)
Engineers' Society of Western Pa. Chairman, W. J. Murdoch, Hotel Wm. Penn, Pittsburgh, Pa.

OCT. 18-20—PITTSBURGH, PA. (Roosevelt Hotel)
Pennsylvania Section A.W.W.A. Sec'y, Myron G. Mansfield, 1312 Park Bldg., Pittsburgh, Pa.

OCT. 23-25—CHARLESTON, S.C. (Hotel Fort Sumter)
Southeastern Section A.W.W.A. Sec'y, T. A. Kolb, 433 Wade Hampton Bldg., Columbia, S. C.

OCT. 23-25—MEMPHIS, TENN.
Kentucky-Tennessee Industrial Wastes & Sewage Works Assn. Sec'y, R. P. Farrell, 420 Sixth Ave., N., Nashville, Tenn.

OCT. 24-27—SAN DIEGO, CALIF. (U.S. Grant Hotel)
California Section A.W.W.A. (Annual Meeting) Sec'y, Wm. W. Aultman, Box 38, LaVerne, Calif.

OCT. 25-27—DETROIT, MICH. (Detroit Leland Hotel)
Michigan Section A.W.W.A. Sec'y, T. L. Vander Velde, 2609 E. Saginaw St., Lansing 12, Mich.

OCT. 26-27—DES MOINES, IOWA (Fort Des Moines)
Iowa Section A.W.W.A. Sec'y, H. F. Blomquist, City Water Works, Cedar Rapids, Ia.

OCT. 26-28—ATLANTIC CITY, N.J. (Hotel Madison)
New Jersey Section A.W.W.A. Sec'y, C. B. Tygert, P. O. Box 178, Newark, N. J.

NOV. 1-3—WILMINTON, DEL. (DuPont Hotel)
Chesapeake Section A.W.W.A. Sec'y, C. J. Lauter, 5902 Dalecarlia Place, Washington 16, D. C.

NOV. 6-7—RICHMOND, VA. (Jefferson Hotel)
Virginia Section A.W.W.A. Sec'y, W. H. Shewbridge, 713 State Office Bldg., Richmond, Pa.

NOV. 13-15—DURHAM, N.C. (Washington-Duke Hotel)
North Carolina Section A.W.W.A. and North Carolina Sewage Works Association. Sec'y, E. C. Hubbard, State Board of Health, Raleigh, N. C.

NOV. 12-15—FT. LAUDERDALE, FLA. (Governor's Club Hotel)
Florida Section A.W.W.A. Sec'y, Marvin R. Boyce, 504 Pennsylvania, Clearwater, Fla. (Joint Session with) **Cuban Section A.W.W.A.** Sec'y, L. H. Daniel, Baratillog 9, Havana Cuba (and) **Florida Sewage Works Association.** Sec'y, Perry Teeple, P. O. Box 210, Jacksonville, Fla.

NOV. 16—BOSTON, MASS. (Hotel Statler)
New England Water Works Assn. Sec'y, Jos. C. Knox, 204 Tremont Bldg., Boston, Mass.

NOV. 17-19—MESA, ARIZONA
Arizona Sewage & Water Works Association. Sec'y, Helen Rotthaus, San Eng. Div., State Capitol, Phoenix, Ariz.

NOV. 30-DEC. 2—TUCSON, ARIZ. (Hotel Pioneer)
Arizona Section A.W.W.A. Sec'y, Mrs. Helen Rotthaus, State Dept. of Health, Phoenix, Ariz.

DEC. 21—BOSTON, MASS. (Hotel Statler)
New England Water Works Assn. Sec'y, Jos. C. Knox, 204 Tremont Bldg., Boston, Mass.

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BELL & SPIGOT
CAST IRON PIPE
EASY
• To CUT
• To TAP
• To LAY
It is corrosion resistant cast iron. Made to the rigid Standard Class 150 Federal specifications — 500 pound test.

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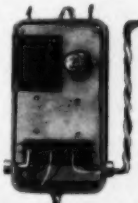

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Has **no moving parts**—no **floats**—Operates electronically with 1/10000 Amp. impulse. Just two steel rods in container—nothing else. Controls directly pump motors, motorized valves. Simple installation. Practically no up-keep.
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407 S. Dearborn Street Chicago 5, Ill

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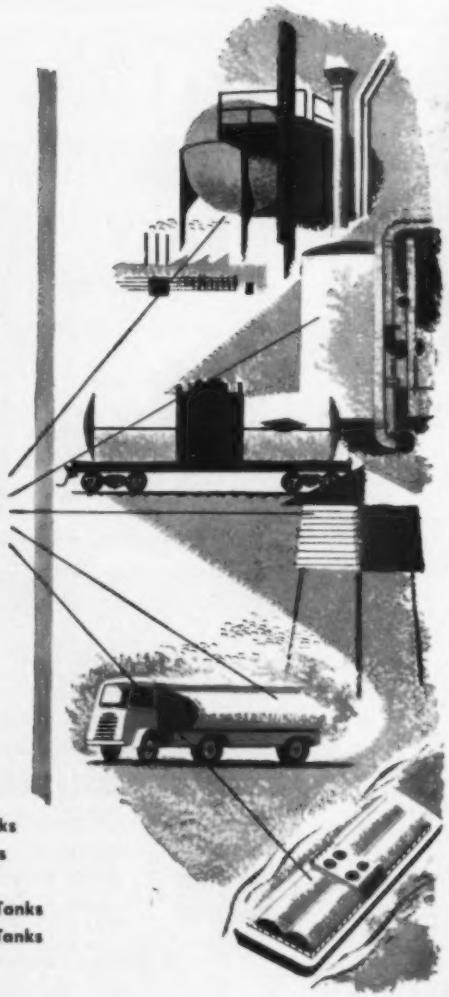
with

SARAN RUBBER TANK LINING



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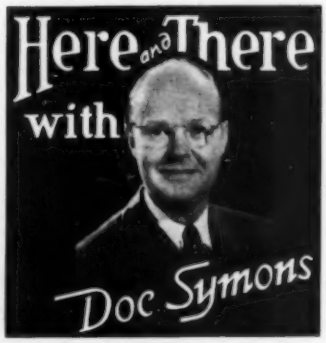

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I really heard from three persons if you count a letter from Mary Rodgers, Mr. Jordan's Secretary, but she saw the original photograph. 'Taint fair.

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(Continued on page 92A)

THE SILENT WATCHMAN

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MEMPHIS 1, TENNESSEE

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Nation Wide Service—30 Years Experience

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SOUND PRINCIPLES OF WATER TANK MAINTENANCE and TANK TALK, by W. A. RILEY

—SAFETY—SERVICE—SATISFACTION—

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TENNESSEE CORPORATION
Ferri-Floc
FERRIC SULPHATE
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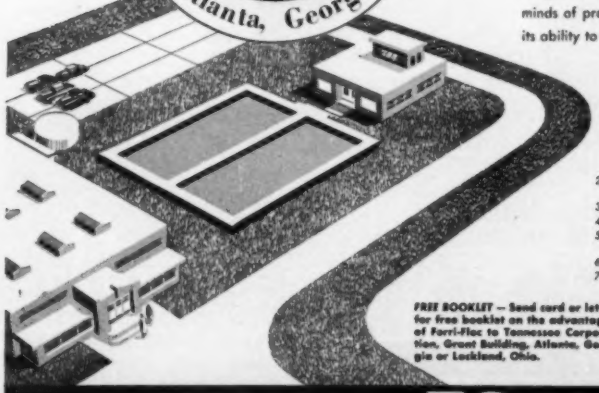
Results Count!

- MORE ECONOMICAL
- EASIER TO HANDLE
- SUPERIOR RESULTS

The use of Ferri-Floc in water supplies has several advantages over other coagulants now in use. Economy of operation is a great factor in the minds of prospective users, but, once used Ferri-Floc immediately shows its ability to produce a higher quality of water at a lower cost.



ADVANTAGES OF FERRI-FLOC

Coagulation is effective over a much wider pH range than with alum. Color flocs may be formed in the very acid range, where alum may not be employed. On the other hand, true hydrated ferric oxide flocs may be formed at pH 9-10, or even higher for the removal of turbidity and manganese.

2. *The time required for floc formation, conditioning, and settling is in many cases considerably shorter than that required for other coagulants.*
3. *Filter runs have been markedly increased in several cases.*
4. *Manganese is successfully removed at pH values above 9.*
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6. *Hydrogen sulfide is removed, and taste and odor improved.*
7. *Ferric floc does not seem to stick to sand grains to form mud balls, and is subject to less "breaking through" on the filters.*

FREE BOOKLET — Send card or letter for free booklet on the advantages of Ferri-Floc to Tennessee Corporation, Grant Building, Atlanta, Georgia or Lockland, Ohio.

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Atlanta, Georgia — Lockland, Ohio

cut corrosion costs

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SARAN RUBBER TANK LINING

in **Storage Tanks**
Tank Trailers
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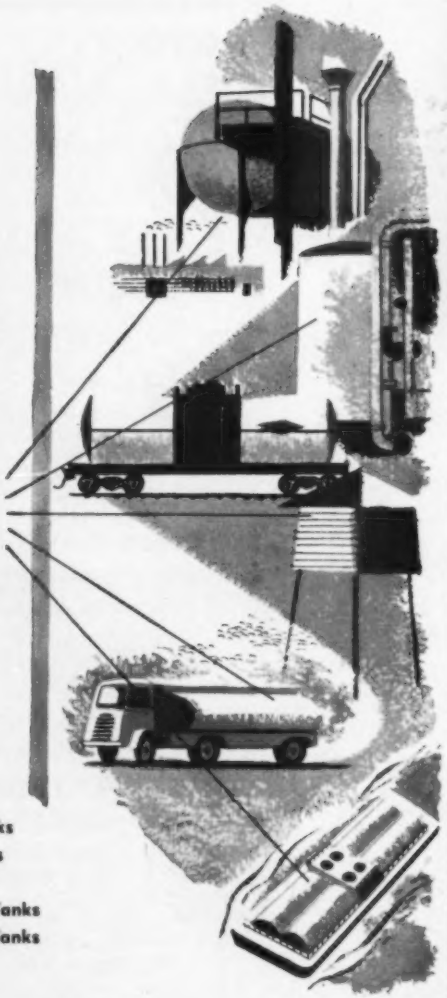

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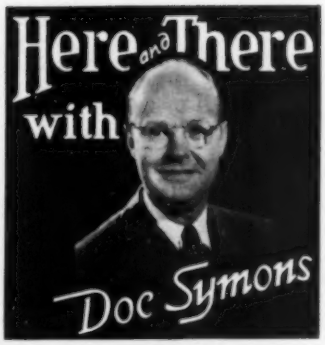

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(*Continued on page* 92A)

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TENNESSEE CORPORATION
Ferri-Floc
FERRIC SULPHATE
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Results Count!

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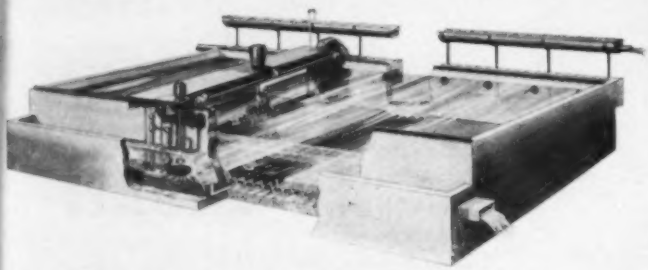
"Don't jump! There's still hope! Try HARDINGE AUTOMATIC BACKWASH SAND FILTERS!"



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(*Continued from page* 90A)

This year, I had the pleasure of excorting the new First Lady of AWWA (Marion Weir) to the cocktail party while "Vic" was busy elsewhere and imagine my embarrassment when in introducing her with a flourish to Gen. Armstrong, Pres. of U. S. Pipe, I knocked a glass out of his hand.—Woe is me!!!

* * *

Nicest garden party I ever attended was the cocktail party given by Frank (Phila. Cons. Engr.) and Sara Friel at their beautiful—and I do mean lovely—home in Bryn Mawr. It was a party for the AWWA Board of Directors. To the accompaniment of a strolling accordionist, there was some impromptu dancing on the lawn, as you can see the picture herewith. My Canadian

friends will recognize that perennial bachelor and one time AWWA President from Peterborough, Ont., Kissin' Ross Dobbin. The hat conceals a very attractive bachelor girl, who scared Ross silly when she said she was a psychiatrist. I moved slightly to one side and bowed my own head in reverence when she passed. —Nice girl, though!

* * *

Speaking of lovelies— One of the superlatives was Joan Weir, daughter of Vic and Marion. She came down from school in Connecticut to see "Daddy" installed as President. She had a front row seat—right next to George W. Kelsey, (Vice Pres.,

Builders Iron Foundry, Providence) reputed to be one of the best dancers at the convention. —Lucky George —Another George was not so lucky!

(*Continued on page* 94A)

Now you can machine
TRANSITE PIPE
on the job
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Now a simplex coupling can be used at any point where pipe is cut. Save time in the field and utilize all odd lengths.

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- ★ Activated carbon at carload prices to the small quantity buyer.
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★ All this debris taken from 10" pipe. Section shows perfect job.

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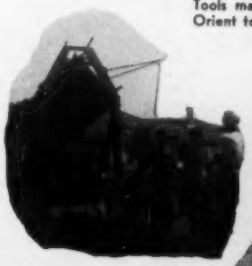
★ "Flexible Power Bucket Machines, Power Drive Rods and Tools make work easier in the Orient too.

SEWER LINES



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4455 S. E. 24th Ave. Portland 2, Ore.
P. O. Box 447 Lancaster, Texas

(*Continued from page* 92A)

Sad Tale—Just as the Harry Jordans were crossing the bridge from Camden, N.J. to Philadelphia, Ruth (That's Mrs. Harry) remembered that she had left her suitcase at home. Daughter Lois Schultz had to drive back to Port Washington, L.I. for it. Hope they didn't forget anything at the hotel in Philly when they left for a vacation in Martinsville, Ind., day after the convention.

* * *

Being a Badger by adoption, I was invited to attend the picnic held by the Wisconsin delegation. About thirty-six conventioneers from Wisconsin showed up at the home of J. W. (Jimmy) Myers in Wayne, Pa. "Jimmy" is Vice Pres. of the Philadelphia Suburban Water Co. but not too many years ago he was Supt. of Water at Kenosha, Wis. He and his incomparable "Susy" are still Badgers at heart and you can bet that the picnic, although it had to be held indoors, was a treat to the whole gang. Harold (Ted) and Mrs. Rudgal from Kenosha, drove me out.

As seems customary, the men all gathered in one room as you can see for yourself. The bottles which they are holding contain Waukesha water direct from Art Kuranz' water works by way of the Foxhead bottling plant.

Francis Cunningham, that Neptune Meter Man from Milwaukee, made a tremendous hit with the ladies when he presented them all with orchids. And was he tickled pink when a cute blonde guest from New York bussed him soundly because it was the first orchid she had ever received.

In addition to the Waukesha water (in brown bottles) there were several cheeses direct from Wisconsin, including some that "Pat" McGuire sent from Plymouth, (where the cheese prices of the country are set) and some Swiss Cheese from Monroe, where Zenno Gorder holds forth.

* * *

In the exhibit hall.—This year the "Nuchar" boys had a taste test with a cute number to check you up. And the Florida section had an orange juice stand again. One enterprising exhibitor had a television set to attract attention, but I must confess that the most popular place in the hall was the "coke" stand.—courtesy of the Manufacturers Assn. And if you want to know, they dished out 150 cases of Coca-Cola during the week. 150 cases at 24 bottles per case; that's 3600 bottles or about 1.8 bottles per registrant. Somebody was gyped, for I had half a case myself.

* * *

One of the featured attractions of the convention was the Bridge Tournament which was held under the auspices of the $P_3B_3P_2$ organization in the rooms of one Charles (De Laval Pumps) Coleman of Trenton. A score chart kept on the wall showed that 34 persons took part and there were dozens more kibitzing.

The official report on the tournament reads something like this, as sent in by Charlie Coleman, to wit:

"Of course, when the tournament began, we expected that the man from the deep south, Marsden 'Churchill' Smith of Richmond, Virginia would be the only winner. He did do fairly well as he played 14 rubbers and won a total of 91c, where some of the better players such as E. A. Sigworth, who played

(*Continued on page* 96A)

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CAPACITY 2000 lbs. Per 24 hrs.
Meters available from 4 lbs. per 24 hrs.
CAPACITY 400 lbs. Per 24 hrs.
Meters available from 4 lbs. per 24 hrs.
MODEL CVS
MODEL DVS
BUILDERS Chlorinizers are available in two volumetric models (CVS and DVS) which are identical in the way they control and meter chlorine. Differences in capacities and cabinet designs offer a selection to suit every "chlorinization" need.
Each model employs the same dependable tantalum diaphragm control valve . . . handles chlorine through vital parts in the dry, non-corrosive state . . . utilizes the Sightflo indicator which shows feed only when there is feed. For engineering information and descriptive Bulletins, address Builders-Providence, Inc. (Division of Builders Iron Foundry), 350 Harris Ave., Providence 1, R. I.
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The Venturi Meter • Propelaflo and Orifice Meters • Kennison Nozzles • Venturi Filter Controllers and Gauges • Conveyaflo Meters • Type M and Flo-Watch Instruments • Wheeler Filter Bottoms • Master Controllers Chlorinizers — Chlorine Gas Feeders Filter Operating Tables • Manometers • Chronaflo Telemeters
130 YEARS 1820 BUILDERS 1950 BUILDERS IRON FOUNDRY
BUILDERS PROVIDENCE Instruments
SAFE • DEPENDABLE • ACCURATE

The valve that's

forever seated

A PERFECT APPLICATION FOR SEWAGE DISPOSAL SERVICES

LUBRICATED — *external repressuring screw*
AUTOMATIC LUBRICATION WITH HYPERMATIC

EASY OPERATION — *quarter-turn to close*

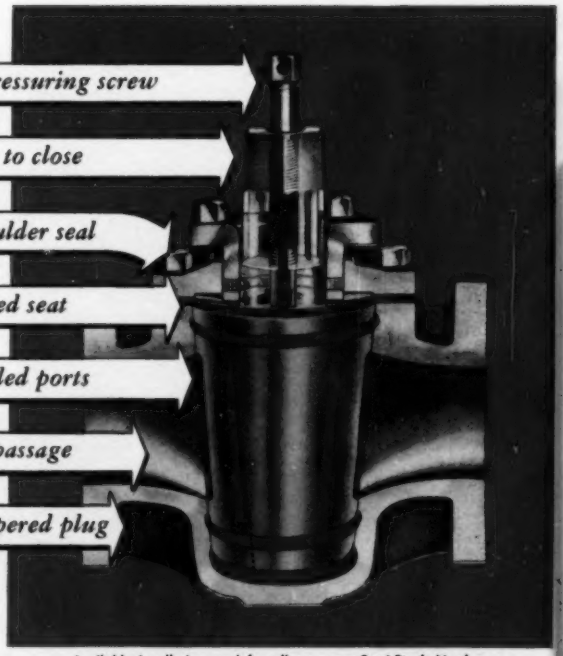
ANTI-FRICTION — *resilient shoulder seal*

UNEXPOSED — *fully-protected seat*

NON-LEAKING — *lubricant-sealed ports*

FLUSH WALLS — *streamlined passage*

NON-STICKING — *full-seated tapered plug*



Conventional valves have to unseat to open. Nordstrom valves never unseat. The plug turns on an unexposed seat. Abrasives cannot intrude to cut the seat. Result? Longest life. Positive closure.

Available in all sizes and for all pressures Semi-Steel, Nordco Steel, Stainless Steel, bronze and Special alloys. Ask for Bulletin.

Nordstrom Valves

NOW AUTOMATICALLY LUBRICATED WITH TRADE MARK *Hypermatic* PATENTS APPLIED FOR

***Nordstrom Valve Division*—ROCKWELL MANUFACTURING CO.**
400 North Lexington Avenue, Pittsburgh 8, Pa., Offices in all principal cities

ROCKWELL

Export — Rockwell Mfg. Co., International Division, Empire State Building, New York 1

(Continued from page 95A)

only 12 rubbers, won $1.09 and then used an alibi that he had lousy partners. Best player in the crowd was John A. Caton who played only 9 rubbers and won $1.79. Incidentally, he did not lose but 1 rubber and that rubber gave him a plus score of 5c.

"Some of the old standbys, such as Harry J. Krum, played in 31 rubbers and was minus 6c, so you can readily see that he really is not in a class to be in a bridge tournament. The same could be said regarding I. M. Glace who played in 28 rubbers and was minus 85c. His alibi was not feeling well. Harry Lendall played in 18 rubbers and was minus 11c, whereas, George Naylor of the American Water Works and Service Co., played in 24 rubbers and was plus 4c.

"I just got in with a plus 45c after playing 19 rubbers. However, I will alibi by stating that I was under a terrific strain during the process of plays. Of the 34 players, the greatest loser was only 90c."

You Can't Tell the Players Without a Score Card—

Charles E. Coleman, Engineer, De Laval Steam Turbine Co., Trenton, N.J.

Marsden "Churchill" Smith, Chief Engr., Dept. Pub. Wks., Richmond, Va.

E. A. (Nuchar) Sigworth, Chem. & Tech., Ind. Chem. Sales Div., W. Va. Pulp & Paper Co., New York City.

John A. Caton, Sales Engr., Warren Fdry. & Pipe Co.

Harry J. Krum, City Chemist, Allentown, Penna.

I. M. Glace, Cons. Engr., Harrisburg, Penna.

Harry N. Lendall, Prof. of Civ. Engr. (Ret.), Rutgers Univ., New Brunswick, N.J.

George W. Naylor, Mgr., Punxsutawney Water Service Co., Punxsutawney, Penna.

* * *

A copy of Mr. Coleman's report went to all persons mentioned except Messrs. Caton and Naylor. Just as this column went to the printer, a letter was received from Mr. Sigworth commenting on Coleman's report. Mr. Sigworth's comments will appear in full in the August issue.

* * *

THE SOCIETY OF COUNCIL BLUFFERS — Minutes of 1950 meeting.—Meeting was called to order by E. M. (Casey) Jones at 1 A.M., Friday, May 26. Present were the following members: Harry (Permutit) Boehner, "Casey" (Simplex Valve) and "Dot" Jones, Wendell (Akron Water) and Tina La Due, Sam (Elizabeth, N.J. Water) Newkirk, Dan (Permutit) and "Lil" Saunders, George E. (Doc) Symons and associate members Reg (Hydrotite) and Buelah Hayes, and "Dottie" (Mrs. Harry) Boehner. Absent were the late "Jake" Van Atta (whose gag on the trip to the 1947 San Francisco convention originated the society), Mary Van Atta, A. E. (W & T) Griffin, and associate members, Mrs. Newkirk, Mrs. Griffin, and Mrs. Symons.

After a toast to the absent ones, the meeting got down to business. It was pointed out that the membership of this organization includes two past presidents of the AWWA, two past presidents of the WSWMA and a Veep Elect of the WSWMA.

By a solemn vote of the assembled members, it was decided that the Jim (W & T) and Agnes Kinney of Toronto had forfeited their right to associate membership by not being on hand for initiation.

At the annual breakfast which followed the meeting, election of officers was carried on according to the by laws which state: "The game of Honest John shall be played at the annual breakfast by the male mem-

SINGLE AND DOUBLE LID

METER BOX COVERS

for every Climate and Condition

Ford Meter Box Covers are made in sizes to fit on meter box barrels or tile from 15" to 36" diameter. They are made with several sizes of lid openings, with inset or overlapping lids, for sidewalk or lawn installations, for light or heavy traffic conditions. For really cold climates double-lid covers are recommended.

All are fitted with the Lifter Worm Lock that effects a tight fit, permits easy opening even when sealed with ice or dirt and makes it easy to lift the lid with the key.

Send for complete Ford Catalog No. 50. It describes Ford Covers and many other useful devices for more efficient metering of water services.

THE FORD METER BOX COMPANY, INC.

FOR BETTER WATER SERVICES

FORD

Wabash, Indiana

bers of the society to determine who will become the next president." The man so elected has the dubious honor of paying for the breakfast. The Vice President is selected in the same manner and pays the breakfast tip. Be it reported here that one "Doc" Symons is the new president and Sam Newkirk is the new Vice President.— Next meeting, Miami, Fla., about 1:00 A.M., Fri., May 4, 1951—All members and associate members are requested to attend.

* * *

Time to sign off for this issue. Be back next month with more about the Philadelphia Convention, and some other meetings around the country.

V.T.Y.—**Doc**

THE SPILLWAY

[Overflow from the main section]

Stiemke To Head Georgia Tech Civil Engineering

Announcement has been made of the appointment of Robt. E. Stiemke as Director of the School of Civil

Engineering at Georgia Institute of Technology. Professor Stiemke leaves his present post as Professor of Sanitary Engineering at Pennsylvania State College at the end of August.

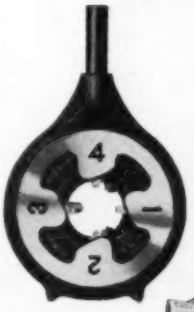
A native of Milwaukee and a graduate of the University of Wisconsin with a masters degree in 1940, Prof. Stiemke began his professional career as a junior engineer in the U.S. Army Corp of Engineers. He later served as an instructor at Wayne University in Detroit and worked with Hubell, Roth, and Clark, Cons. Engrs.

From 1942 to 1947, he was Associate Professor of Sanitary Engineering at North Carolina State College except for an 18 month stint with the U.S. Pub. Health Service during the war. In 1947 he became Professor of Sanitary Engineering at Penn State.

NOW New Streamlined RIDGID 65R

Die Stock that WON'T JAM

while threading with power drive or by hand



New *JAM-PROOF* drive plate automatically kicks out driving ratchet pawl when standard length thread is cut.... You don't have to watch it—lead screw can't jam on workholder.

Right Here **is the simple foolproof mechanism that makes 65R automatically *JAM-PROOF.***

You can convert your present 65R to new JAM-PROOF type **— buy new drive plate, put in place of old plate.**

All other RIDGID 65R features remain the same

Perfect threads on 1" to 2" pipe with 1 set of high-speed steel dies—sets to pipe size in 10 seconds—mistake-proof self-centering workholder sets instantly—and now it's *JAM-PROOF.*

Buy new JAM-PROOF RIDGID 65R at your supply house

RIDGID

WORK-SAVER PIPE TOOLS

THE RIDGE TOOL CO. • ELYRIA, OHIO

A registered professional engineer in Michigan, North Carolina and Pennsylvania, Prof. Stiemke has been active in ASCE, AWWA, PaSIWA, and only last year he was appointed Secretary of the Pennsylvania Water Works Operators Assn. to succeed the retiring I. M. (Mike) Glace.

In his stay at Penn State, Prof. Stiemke has been a moving spirit in the annual meetings of the Pa-WWOA and PaSIWA held each August at State College, Pa. He has also been instrumental in holding several schools for water works and sewage works operators.

Task Committee on Industrial Wastes Established

Representatives of 22 of the nation's leading industries concerned with solving difficult industrial waste problems held a two-day conference with the Public Health Service early in May.

The meeting resulted in the establishment of a National Technical Task Committee on Industrial Wastes. This committee drew up broad outlines of an Industry-Federal Government approach to the control of water pollution caused by industrial wastes. The committee then set itself three immediate tasks:

1. To assemble a source list of existing processes and practices employed in using, treating, and controlling industrial wastes.

2. To assemble a tabulation of research projects concerned with utilization, treatment and disposal of wastes, both underway and contemplated.

3. To provide a list which will define problems that confront a given industrial group and for which there is no satisfactory solution, particularly those which are common to more than one industry.

The Committee elected the following Officers: *Chairman*, Lyman Cox, Waste Disposal Consultant, E. I. DuPont de Nemours & Co., Inc.; *Vice Chairman*, Dr. Harry Gehm, Tech. Dir., National Council on Stream Improvement of the Pulp, Paper and Paperboard Industries, Inc.; *Secretary*, Louis F. Warrick, Chief, Technical Services Branch, Div. of Water Pollution Control, Public Health Service.

The Task Committee established four task groups, Food Industries, Mineral Products, Chemical Processing, and General Industries.

CENTRILINE

CONFORMS STRICTLY WITH A.W.W.A. SPECIFICATIONS

▶▶▶ PIPE LINING FACTS NO. 3

▶▶▶▶ The Standard Specifications for cement-mortar protective coatings issued by the American Water Works Association provide: "Interior of the entire line, including both curves and tangents, shall be by centrifugal machine . . . the machine shall apply the mortar by centrifugal action without the use of compressed air and follow its application by automatic trowelling to a uniform thickness and smooth finished surface."

The strict adherence to these specifications by Centriline insures a continuous, dense, smooth lining—applied without rebound—that means restored carrying capacity perpetually sustained and longer life to mains. If pipelines are losing efficiency it is time to consider Centrilining. Our engineers stand ready to assist you, without obligation.

▶▶▶▶ WRITE TODAY FOR THE 28 PAGE CENTRILINE CATALOG

CENTRILINE CORPORATION

A subsidiary of Raymond Concrete Pile Co.

140 CEDAR STREET • NEW YORK 6, N.Y.

Branch Offices in all Principal Cities in the United States and Latin America.

Reg. U. S. Pat. Off.

CEMENT MORTAR LININGS FOR WATER MAINS

Centrifugally Applied in Strict Conformity with A.W.W.A. Specifications

MANUFACTURERS' *and* EQUIPMENT NEWS

701

Polyken Pipe Coating

Plastic Engineering & Sales Corp, Ft. Worth, Tex., has announced the availability of Bauer & Black's Polyken Corrosion Protection Coating, a complete, one-operation, single-material pipe coating that is applied cold. No heat, flame, solvents or greases are required for application. Polyken an oriented Polyethylene film with a synthetic adhesive applied to one side has remarkable electrical and chemical resistance properties. By virtue of its elasticity, Polyken maintains a permanent pressure around the pipe equal to the tension exerted when the tape is

(*Continued on page* 99A)

READER SERVICE CARDS for

WATER & SEWAGE WORKS

Equipment — Products
Information — Literature

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CLIP
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TO
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WATER & SEWAGE WORKS READER SERVICE

READER SERVICE CARDS HOW TO USE THEM

Please fill out a separate coupon for each item on which you desire information. This will greatly facilitate handling.

Key number is at head of each new product, item of equipment, catalog or bulletin, described in this issue.

Enter key number in box.

Please PRINT your name and title, company or department name, and your address

NOTE—

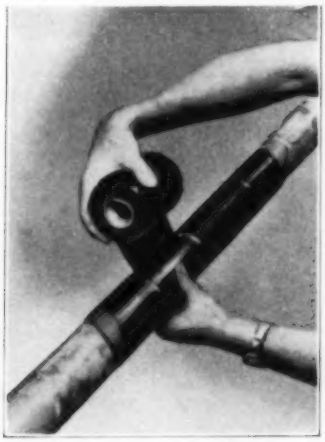
These cards are to be used only for items described in THIS ISSUE

WATER & SEWAGE WORKS

Will see that you receive information desired.

(Continued from page 98A)

applied, thus preventing the flow of moisture between the tape and the protected metal.



To obtain further information on this protective coating, use a Reader Service Card on which is entered the above key number and your name and address.

Insul-Mastic Coats Chicago Sewers

More than 22 miles of pipe of the Chicago Sanitary District were recently sprayed with a mastic insulation to prevent both condensation and corrosion. These sewers are pipes which pass under the city through 12,000 feet of tunnels eight feet wide and nine feet high. Pipe sizes range from 1½ to 30 in. in diameter, the smaller ones carrying water.

The material applied is known as Insul-Mastic Type D and is manufactured by the Insul-Mastic Corp. of America, Pittsburgh, Pa. The product is a Gilsonite base and may be applied by spray gun to a thickness of ¼ to ⅜ in. It has a K Factor of approximately 0.36 per sq. ft. per in. thickness.

702

Differential Master Sender

Hagan Corp., Pittsburgh, Penna., has developed a High Pressure Differential Master Sender which is a pneumatic transmitting unit designed to generate an output loading pressure which is directly proportional to a pressure differential impressed upon the measuring bellows. This sender may be used as a prime

WESTINGHOUSE solves critical waste disposal problem with FOXBORO pH Control

When the Westinghouse plant in Beaver, Pa., was being planned, it was realized that the waste from plating tanks would run as high as 80,000 gallons of acid solution and 25,000 gallons of cyanide solution per day. Disposal of these wastes constituted a critical problem.

Cyrus Wm. Rice & Co., Inc. was retained to analyze the problem and design a treatment plant. A Foxboro pH Control System was specified to maintain optimum pH for cyanide reduction as well as proper pH of the effluent. The outstanding control which resulted is shown on the chart below.

This Westinghouse installation is only one example of the many types of industrial waste problems which have been solved with Foxboro pH Control. Whatever your waste disposal problem, Foxboro Instruments properly applied can be counted on to reduce both initial investment and operating costs. Talk it over with your nearest Foxboro representative, or write **The Foxboro Company, 228 Neponset Ave., Foxboro, Mass., U. S. A.**

1. Central control panel including Foxboro Dynalog* pH Controllers—heart of this outstanding installation.

*Reg. U. S. Pat. Off.

2. Typical 24 hour pH record taken at weir to the sewer. Notice the uniformity of record — indicating control of effluent within 1/10 of a pH unit.

FOXBORO pH CONTROLLERS

regulator when equipped with an automatic reset bellows. Made of Cast steel with a multiple-ply phosphor bronze sealing bellows and measuring bellows of stainless steel it is designed for immediate and accurate response, minimum maintenance requirements and long life.

A supply of compressed air is required as the power medium, and loading pressure ranges may be 3-15 pounds, 0-30 pounds, or 0-60 pounds. The loading pressure may be used as a control signal for an automatic control system, or as a loading to actuate indicating or recording instruments.

For further information on this Master Sender, use a Reader Service Card on which is entered the above key number and your name and address.

Worthington Dual-Fuel Engines at Bay Park, L.I.

The first supercharged, dual-fuel engines to operate on sewage sludge gas or oil in the east are being installed in Bay Park, Long Island, by Worthington Pump & Mach. Corp. as part of a $7,500,000 new Nassau County Sewage System, which will serve 53 per cent of the county area and 83 per cent of the population.

In the main building there will be five supercharged, dual-fuel engines totaling 2,925 horsepower. Two engines will drive a-c generators for electric energy used in the main sewage-treatment-plant power requirements and the two other engines will drive rotary positive displacement type blowers for air distributed in the aeration tanks and have a rated capacity of 8,500 cfm. of free air at 8 psi. The fifth and largest unit is a combination drive to both a 500 kw generator and 16,000 cfm. blower.

The plant, which is expected to be placed in operation at the end of this year, will treat 27 mgd when in full operation.

DIESEL POWERED MUNICIPAL PUMPING STATION REPORTS PUMPING COSTS CUT 25%

Three New Pumps Replace One Old

The age of the damaged pump and high cost of repairs militated against any attempts to put it back in operation, and thus the decision was made to replace it with the three horizontal centrifugal pumps. The pumps selected were Peerless Pumps, characterized by the occurrence of normal operation in the 87% efficiency range. Normal operation, dictated by the top level of elevated storage, is at 67 pounds' pressure and 2,500 gpm.

Reprinted from American City Magazine, February, 1950

87% EFFICIENCY RANGE CHARACTERIZES PEERLESS PUMP INSTALLATION FOR EASTERN CITY

Municipalities count high efficiencies over extended pumping periods as only one reason for their acceptance of Peerless centrifugal pumps. Dependability, ease of maintenance, widest capacity range, quality construction set the Peerless standard for pump performance and operating economy. Look to Peerless for continued leadership in pumping water at measurable savings. Write today for Bulletin B-1300 describing and illustrating Peerless Type A horizontal pumps, shown installed in the photo above.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Factories: Los Angeles, California, and Indianapolis, Indiana
Offices: New York; Atlanta; Fresno; Los Angeles; Chicago; St. Louis; Phoenix; Dallas, Plainview and Lubbock, Texas.

703

New Cooling Water Control

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., has designed a new insertion-type pneumatic temperature control, so small it can be installed in a two-inch water line for machines or processes using water as a cooling medium.

Designed for use with Honeywell pneumatic valves on restricted, recirculated and other systems, such as stationary gas or diesel engines, presses and other installations, this pneumatic throttling control provides water economy and increased process efficiency. A liquid-filled element gives the new device high sensitivity and fast action.

To obtain further information on this new pneumatic control, use a Reader Service Card on which is entered the above key number and your name and address.

Sickert Works Manager Peerless Pump Div.

Peerless Pump Division, Food Machinery and Chemical Corp., has announced the appointment of Gene D. Sickert as Works Manager of the Indianapolis plant of the Peerless Pump Division. Sickert joined Peerless from the Bolens Product Division of Food Machinery, where he held a similar position for the last four years. Prior to his association with Food Machinery, Sickert was engaged in the field of plant manage-

ment since his graduation from the University of Wisconsin in 1936. Sickert succeeds L. H. Stermer, resigned.

704

HF Payloader

Frank G. Hough Co., Libertyville, Ill., announces its completely restyled and improved Model HF ¾ yard Payloader tractor shovel.

Included in the improvements are greater engine horsepower, greater built-in tractor effort, more digging power, faster speed ranges and increased stability and balance. Four forward speeds, from 2.4 to 19.5 mph., and four reverse speeds, from

3.5 to 28.7 mph., are provided in the full-reversing transmission. A new, heavy, cast radiator grill at the rear of the Payloader gives effective protection. Boom side-guards are also included as standard equipment.

For additional information on this new Payloader, use a Reader Service Card on which is entered the above key number and your name and address.

705

Hydrant "Jet" Drain

Jet Drain Engineering, Saginaw, Mich., has developed the Adams Jet Drain, which will completely drain a fire hydrant in 60 seconds with no labor required. The only extra equipment needed is a small portable air compressor.

The Adams Jet Drain, solidly constructed of non-corrosive bronze, is easily attached to any standard fire hydrant. A drain-off hose extends down into the barrel of the hydrant, a simple twist of the wrist tightens a pressurized water-lock. The air jet valve is then plugged in, attached to

May we assist you, sir?

If you're on a merry-go-round about handling air or gas, *R-C dual-ability* can help you.

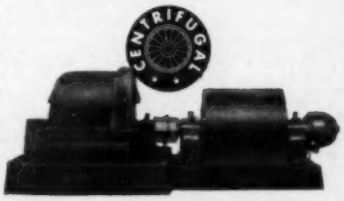
That's been our exclusive job for almost a century. We've developed the most extensive line of blowers, exhausters and gas pumps in the industry, with capacities from 5 cfm to 100,000 cfm.

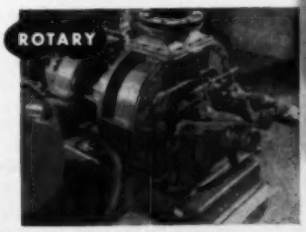
We're the only builders offering that *dual choice* of both Centrifugal and Rotary Positive equipment. Thus, without bias, we can suggest units that meet most closely the requirements of the work to be done.

For new installations or replacements, look to us for your needs. Alert engineering teams up with modern construction to insure long-time, satisfactory performance of R-C equipment.

ROOTS-CONNERSVILLE BLOWER CORPORATION
507 Mount Avenue, Connersville, Indiana

One of three Type H, 3-stage Centrifugal Blowers in large sewage disposal plant. Capacity 15,000 cfm, driven by 700 hp electric motor.





Type HD Rotary Positive Blower in sewage disposal work. Variable capacity from 491 cfm to 1,000 cfm. Motor driven.

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

BOND-O
Homogenized
Self-Caulking
COMPOUND

MACHINE BLENDED

the finest jointing compound available

BOND-O is homogenized. Every pound—every spoonful—is exactly the same as every other pound. This means that with every bag of Bond-O you get consistently excellent results . . . you get the best.

BOND-O Self-Caulking Compound is the only jointing compound available today that gives you unexcelled uniformity of performance. It is the only jointing compound that can guarantee you uniform results from every bag of Bond-O you buy.

• Not one case of Bond-O jointing failure has ever been reported! For what other jointing compound can such claims be made?

BOND-O

NORTHROP & COMPANY, INC.
SPRING VALLEY NEW YORK

the air compressor and the hydrant is completely drained in one minute.

This drain is designed to last a lifetime and is compact and light

enough to be easily transported from one hydrant to another—total weight is less than 5 pounds.

For further information and details on this new drain, use a Reader Service Card on which is entered the above key number and your name and address.

706

Automatic Radial Gate

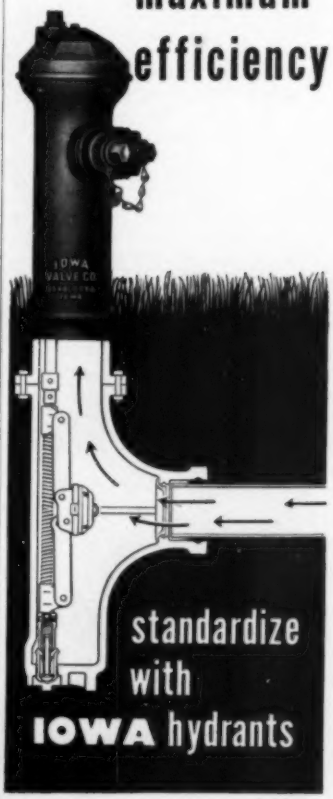
Thompson Pipe & Steel Co., Denver, Colo., has just made the first installation in North America of a French-designed automatic radial gate to control the flow of water from rivers, streams and reservoirs into canals and ditches.

Automatic Radial Gate in Normal Position Being Demonstrated by Pierre Duvel, Grenoble, France, French Hydraulic Laboratories.

Claiming trouble-free, automatic control of stream or canal water level under all conditions, including flood, the manufacturers report the equipment costs substantially less than conventional and complicated gate systems, maintains a more even flow of water, and is more easily regulated. The installation also eliminates the need for a watchman at the intake to regulate the flow.

The gate consists of a steel face plate, structural steel canal arms, ball bearing supports, steel counterweight box, walkway support beams which also serve as a stop for the gate maximum discharge, seals and pin assemblies.

for
maximum
efficiency



standardize
with
IOWA hydrants

Two piece operating nut with special adjustment screw solves the problems of expansion and contraction . . . makes Iowa hydrants easy to operate at all times.

Positive operating mechanical drain valve can be removed along with all other working parts through top of hydrant without special tools.

Fixed position of valve arms makes leaking impossible should standpipe be broken.

Unrestricted water flow gives full pressure at extreme low loss of head.

Built to conform to the latest A.W.W.A. specifications.

IOWA
VALVE COMPANY
201-299 N. Talman Avenue • Chicago 80, Illinois
A subsidiary of James B. Clow & Sons

The French-designed equipment has been widely used for years on irrigation and flood-control projects in North Africa and elsewhere but not until this installation in North America.

For further information regarding this Automatic Radial Gate, use a Reader Service Card on which is entered the above key number and your name and address.

Hall Laboratories Personnel Changes

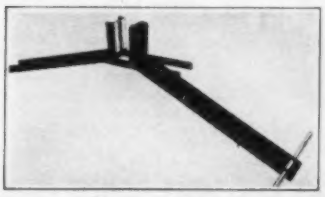
Hall Laboratories, Inc., Pittsburgh, Pa., through D. J. Erickson, president of Hagan Corp., parent company of Hall and Calgon, announced the appointment of Dr. Everett P. Partridge as director of Hall Laboratories, Inc., and Charles E. Kaufman as director of research.

Dr. Partridge has been director of research of Hall Laboratories, Inc., and Calgon, Inc., since 1935 and is internationally known for his research studies in the field of chemical reactions of boiler water with steel, and as a leading authority on application of the molecularly dehydrated phosphates. He has been closely associated with Dr. Ralph E. Hall, whom he succeeds as director of Hall Laboratories, Inc. Dr. Hall is continuing as a member of the board of directors and in a consulting capacity.

Mr. Kaufman joined Hall Laboratories as a research engineer in 1936 after his graduation at the University of Cincinnati. He became a research group head in 1941, and assistant director of research in January, 1949.

707 Gravity-Grip Vise

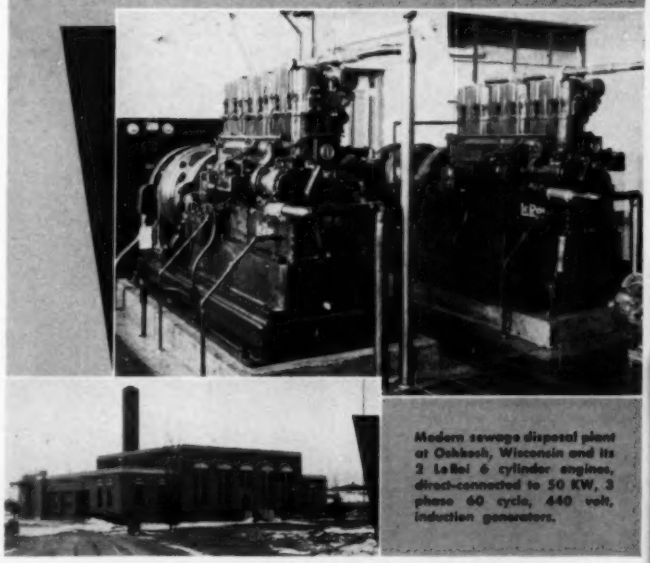
H. D. Fowler Co., Seattle, Wash., is introducing a new Gravity-Grip Vise which holds any size or kind of pipe securely to speed up and simplify pipe cutting. The new vise sets up in 10 seconds and may be adjusted just as quickly to accommodate different size pipes. It holds the pipe



off the ground for easy cutting, grasping it firmly with a non-slip gravity grip. The design is simple in construction, compact and easy to handle in the truck or on the ground.

LE ROI MILWAUKEE

Saves 6 times initial cost in 12 years of continuous service!



Modern sewage disposal plant at Oshkosh, Wisconsin and its 2 LeRoi 6 cylinder engines, direct-connected to 50 KW, 3 phase 60 cycle, 440 volt, induction generators.

Here's proof that Le Roi Engine Generator Sets save taxpayers' money!

In Oshkosh, Wisconsin, two Le Roi engine-generator units operating on "no-cost" sewage gas produce electric power at a cost of .398¢ per kwh. This extremely low cost includes charges for labor, insurance, depreciation, and repairs. Purchased power at the utility rate would be 1.507 cents per kwh. Using Le Roi results in actual savings of nearly $4000 a year for taxpayers!

Lubricating oil, repair parts, and labor cost less than $600 a year for these two twelve-year-old engines. This is real evidence of Le Roi long-life and dependability.

Le Roi engines are available in sizes ranging from 6 to 600 hp — custom generator sets in sizes from 30 to 300 KW. They operate on no-cost sewage gas, natural gas, butane, or gasoline. Lighten the tax load in your community. Investigate the advantages of Le Roi low-cost power. Send the coupon below for a detailed report of this and other money-saving installations.

LE ROI COMPANY
Milwaukee 14, Wisconsin
New York • Washington • Cleveland • Birmingham
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Tear out this coupon and mail TODAY!

LE ROI COMPANY MILWAUKEE 14, WISCONSIN

Please send me complete information on the Oshkosh, Wisconsin Le Roi Engine installation plus other cost-cutting job reports.

Name.....

Title.....

Address.....

City.....(...) State.....

B-67

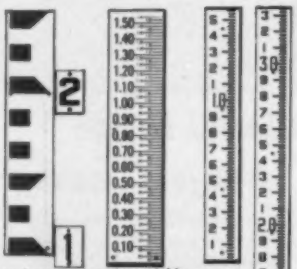
ENGINEER'S FILE ON HYDROGRAPHIC INSTRUMENTS

STEVENS HYDROGRAPHIC INSTRUMENTS

A wide range of precision measuring instruments to record and indicate head, flow, and totalize flow; for waterworks, sewerage, irrigation and industrial uses. New, low cost methods of liquid level recording.

These methods and instruments for all liquid measuring problems are listed in a complete Engineer's Data folder for your convenience. This information folder is *FREE* and can be had by filling in the coupon below. The folder includes data on instruments to record fluctuations of liquids in oil production, stream gaging, deep wells, sewage, irrigation, etc., both accurately and economically.

STAFF GAGES



An inexpensive, dependable means of measuring liquid levels. They are designed so as not to affect the flow of liquid. Porcelain enameled for easier reading . . . accurately graduated in English or metric system . . . will not rust or discolor. Staff gages are available in a wide range of lengths and widths — Staff gages for as little as $1.00. Complete information in the Engineer's Data Folder.

Leupold and Stevens pioneered the field of water level recording 43 years ago, and since then have developed precision measuring instruments of all types and descriptions to meet many specific needs.

Write for the complete file. There may be a measuring device that exactly suits your specific requirements. Use the coupon below.

Please send me the *Engineer's Data Folder* with complete information on Hydrographic instruments.

Name_____

Address_____

City_____ **State**_____

LEUPOLD & STEVENS INSTRUMENTS, INC.
4445 N.E. Glisan • Portland 13, Oregon

Ruggedly built to withstand years of continuous use, the vise holds any size pipe and will grip short lengths or long lengths with equal tenacity. Two models are being presented, V6 for 2 in. to 6 in., pipe, and the V16 for 6 in. to 16 in. pipe.

To obtain further information regarding this gravity-grip vise, use a Reader Service Card on which is entered the above key number, and your name and address.

708

Rigid Plastic Pipe

Carter Products Corp., Cleveland, Ohio, announces the completion of operational tests on a new semi-rigid

plastic pipe. Designated Carlon "T" this new extruded pipe has been developed to supplement the flexible pipe and features much higher tensile and flexural strengths.

Extremely light in weight, Carlon "T" can be laid more rapidly and economically than comparable lengths of ordinary pipe. Carlon "T" pipe is guaranteed against rot, rust, and electrolytic corrosion, and it will not form a galvanic couple. In addition, it is not damaged by freezing water and can be installed above or below frost level.

Connected by means of plastic sleeves, which are first treated with a special cement and then slipped over the ends of the sections to be joined, connections can be made in approximately 30 seconds.

For further information on this new plastic pipe, use a Reader Service Card on which is entered the above key number and your name and address.

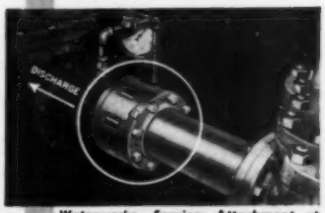
709

Liquid-Level Switch

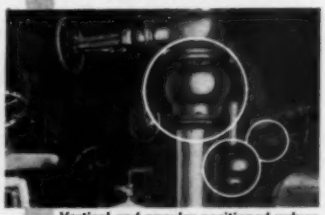
Kenco, Inc., Elyria, Ohio, has available a new and exclusive Floatless Liquid-Level Control Switch that operates on an entirely different prin-

WILLIAMS-HAGER

flanged *Silent check* VALVES



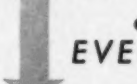
Waterworks. Service: Attachment at small end of 6" by 10" increaser.



Vertical and angular positioned valves protect high pressure pumps at the Longview Fibre Company.

Williams Valves serve the Hot Strip Mill descaling systems in a large Eastern Steel Mill.

on duty *EVERYWHERE*



Dependable protection against water hammer in any position . . . silent operation . . . renewable disc and seat . . . built of materials to suit your installation's needs, in standard pipe sizes from 1" to 20". *Write for Bulletin WH 100.*

THE WILLIAMS GAUGE CO.

Pump Valves . . . Water Gauges . . . Gauge Cocks . . . Steam Traps . . . Pump Governors . . . Feed Water Regulators . . . Water Columns

2000 PENNSYLVANIA AVE. • PITTSBURGH (33), PA.

HYDRANTS and VALVES

Easy To Install MECHANICAL JOINT

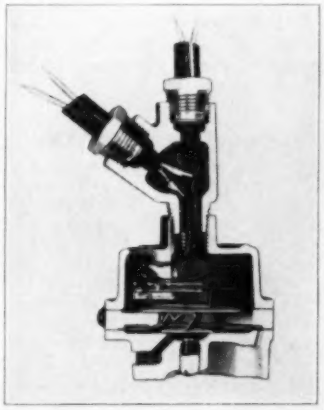
Features include: (1) Fast and easy installation, (2) unskilled labor, (3) construction economy, (4) Joint deflection, (5) leak-tight. We furnish Standardized Mechanical Joint Valves, Hydrants and Cutting-In Sleeves. WRITE FOR CIRCULAR 49.

M & H PRODUCTS INCLUDES

FIRE HYDRANTS
GATE VALVES
WALL CASTINGS
SPECIAL CASTINGS
TAPPING SLEEVES AND VALVES
CHECK VALVES
FLOOR STANDS
SPRING LEVER CHECK VALVES
EXTENSION STEMS
ELECTRIC MOTOR OPERATED VALVE
SHEAR GATES
MUD VALVES
FLAP VALVES
SLUDGE SHOES
FLANGE AND FLARE FITTINGS
FLANGED FITTINGS
B & S FITTINGS
CUTTING-IN TEES
HYDRAULIC OPERATED VALVES

M & H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

ciple than most sump pump switches. The new switch cannot fail to operate as long as there is water and electric power to operate it. Completely submersible, there are no moving parts of the switch assembly exposed to water, and the entire unit is of corrosion resistant bronze construction.



The switch is connected by a pipe nipple to the discharge chamber of the pump. Rising water first traps air in the switch skirt, and creates air pressure, flexing the upper diaphragm which actuates the switch; this in turn sets the sump pump motor in action immediately. Pump pressure is maintained on the lower diaphragm through the mounting pipe connecting the pump to the switch. Pump action continues even after water is pumped below switch skirt that started pump and the pump has removed all water and draws air at the inlet. The entrance of air reduces the pressure and the switch automatically shuts off.

To obtain further information on this Liquid-Level Switch, use a Reader Service Card on which is entered the above key number and your name and address.

LITERATURE AND CATALOGS

710
FLASH MIXERS & "FLOCCULATORS"

Dorr Co., Stamford, Conn., has issued a new two color bulletin entitled **Dorrco Flash Mixers** and **Dorrco "Flocculators."** Amply illustrated with photographs of actual installations in Edmonton, Canada, Kansas City, Frederick, Md., and others, this

FREE

to WATER WORKS and SEWAGE MEN

HOW TO CONTROL ALGAE

"The Use of Copper Sulphate in Control of Microscopic Organisms" by Dr. Frank E. Hale (former Director of Laboratories, Dept. of Water Supply, City of New York) is an authoritative work concerning the control of micro-organisms and elimination of tastes and odors. Describes in detail methods of controlling various forms of microscopic life commonly encountered in water supply systems. Contains descriptive material, plus 48 photo-micrograph studies of organisms discussed.

ROOT AND FUNGUS CONTROL

"Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains," by John W. Hood, contains information published for the first time. This material includes actual methods for control and operating procedure. Here's the book that is a "must" for all sewage men.

GET EITHER OR BOTH OF THESE BOOKLETS ABSOLUTELY FREE— These two valuable booklets, so important to all water works and sewage men, are yours *without obligation*. Mail coupon below!

Write Today, Supply Limited!

PHELPS DODGE REFINING CORPORATION
40 Wall Street, New York 5, N. Y.

Please send my free copy of (check one or both):

☐ "Control of Microscopic Organisms"
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Address _____
City _____ Zone _____ State _____

WR-750

Quality that Lives

Mechanical equipment for water filtration that carries the Roberts Filter nameplate has long been recognized as equipment that gives lasting service. Installations thirty and more years old are still working "round the clock". However, even the finest equipment may need a replacement part occasionally, then you'll be glad you have Roberts Filter, for no part, however small, is an orphan after installation. Replacement parts can be supplied quickly, eliminating delays that are not only costly but often vital.

For water treatment equipment with quality that lives—specify Roberts Filter.

MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

ROBERTS FILTER MANUFACTURING CO.
607 COLUMBIA AVE., DARBY, PA.

M-SCOPE Pipe Finder
LIGHTWEIGHT MODEL

Catalog No. 25M On Request

JOSEPH G. POLLARD CO., INC.
Pipe Line Equipment
New Hyde Park New York

bulletin covers explanations, operation procedures and advantages. In addition to sectional elevation drawings, size and design data it also discusses the Dorr sedimentation units; Squarex Clarifier, Cross-Flow and Sifeed Types and the Dorrco Monorake.

To obtain a copy of this new bulletin, use a Reader Service Card on which is entered the above key number and your name and address.

711
CONCRETE METER BOXES

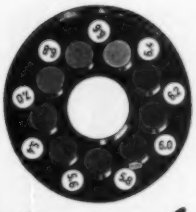
Art Concrete Works, Pasadena, Calif., has just published its **Fortieth Anniversary Meter Box Catalog.** This attractively bound catalog gives a short history of the company and a general description of Art Concrete Meter Boxes. Pages 7 through 17 show the large variety of meter boxes complete with photographs, description and exact specifications of each box. Meter box covers, gate valve boxes, valve boxes, pull boxes are shown in the same manner as the meter boxes. The catalog shows detail cross-section drawings of meter boxes, cone anchors and pipe line markers, plus a description of the California benches and photos taken in the various branch plants throughout the country.

To obtain a copy of this Catalog, use a Reader Service Card on which is entered the above key number and your name and address.

712
PROCESS OXIDATOR SEWAGE TREATMENT

Process Engineers, Inc., Los Angeles, Calif., has completed a new and informative brochure on the **Process Oxidator.** This 12 page bulletin first gives the technical reasoning and practical experience that went into the development of this revolutionary advance in water and sewage treatment. The booklet then describes by text, flow sheets, diagrams and actual photographs, the various types of units now available. The economy and efficiency of the Process Oxidator are demonstrated by actual installations illustrating single and dual stage Bio-Oxidation, the Process Oxidator in conjunction with a biological filter and the Oxidator's value in the treatment of water.

To obtain this complete story of this new aeration, coagulation, sedimentation unit for water or sewage treatment, use a Reader Service Card on which is entered the above key number and your name and address.



FOR pH Control and WATER TESTS
there is nothing like
NON-FADING GLASS COLOR STANDARDS

Permanent reliability of Hellige Glass Color Standards and accuracy of color comparison are exclusive features of Hellige Comparators.

WRITE FOR BULLETIN No. 602

HELLIGE
INCORPORATED
3718 NORTHERN BLVD., LONG ISLAND CITY 1, N.Y.

LEADITE
The Pioneer Self-Caulking Material for C I Pipe

TABLE OF COMPARATIVE QUANTITIES

Nominal inside dia. pipe, in.	Depth of Joint, inches of Leadite	Approx. lbs. of Leadite per joint	Depth of Joint, inches of lead	Approx. lbs. of lead per joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
48	3.50	30.00	3.00	121.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

713

PRESERVATIVE COATINGS

Haynes Products Co., Omaha, Nebr., has a bulletin on **Hayproc Preservative Coatings.** This bulletin discusses in detail their Formula No. 640 which is a clear transparent liquid, made up of seven different waxes and resins dissolved in a hydrocarbon base. This is used for sealing and preserving stone, cast stone, concrete blocks, cement mortar, cement paint, lime or cement, stucco, tile, brick, plaster, wood, etc. Primarily known as a waterproofing compound.

Following this is a listing of other preservative coatings with a short discussion on each.

To obtain a copy of this bulletin, use a Reader Service Card on which is entered the above key number and your name and address.

714

SURFACE WASH SYSTEMS

Stuart Corp., Baltimore, Md., has issued a technical booklet on **Palmer Surface Wash Systems** and **Walking Beam Floccers.** This booklet contains a reprint of a paper on Surface Wash that was presented before the New York Section of American Water Works Association June 7, 1940. The company states that the many requests for technical information of this type prompted it to publish it in this form. Amply illustrated with pictures of Palmer filter bed agitators and cross section diagrams it explains the action of these filters. The engineering data also covers complete specifications on the filter bed agitators. Instructions are included for determining the correct number of Palmer Agitators to use on various size filters.

To obtain a copy of this technical booklet, use a Reader Service Card on which is entered the above key number and your name and address.

715

SOLDER FITTINGS & COPPER PIPE

Mueller Brass Co., Port Huron, Mich., has published a 40 page catalog on **Streamline Solder Fittings and Copper Pipe.**

This catalog has a photographic illustration for each item listed and lists under each item complete sizes, part number and price. It covers couplings, bushing, adaptors, unions, 90° elbows, drop ear elbows, tees, crosses, caps, plugs, return bends, flangers, reducers, drainage fittings, water works fittings for corporation stops and meter couplings, valves, compression stops, still cocks, swing

FILER & STOWELL SLUICE GATES

are built to stand long trouble free service. Amply proportioned for all stresses of shipment, erection and operation. They may be obtained with manual, hydraulic cylinder or motor operating controls.

THE FILER & STOWELL COMPANY
MILWAUKEE 7, WISC.

ZECO GREENSAND ZEOLITE

ZECO and HI-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.

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Sales Office: 140 Cedar St., New York, N.Y. — Factory: Medford, N.J.
Pioneer Producer of GREENSAND ZEOLITE MINERAL

STOP WATER SEEPAGE SEWAGE CORROSION

WITH FORMULA No. 640

a clear liquid penetrating (1"+) sealer for concrete and masonry preventing water absorption and reducing the action of acids. Holds 12' hydrostatic head. Use our Hayproc Rubberized Enamel for color on walls and floors—not affected by concentrated acids, alcohol, oil, or traffic abrasion.

30 OTHER PRODUCTS
Write for technical data.

Haynes Products Co., Omaha 3, Nebr.
See our file in Sweet's

check valves, spray heads, accessories, solder and fluxes.

To obtain a copy of this catalog, use a Reader Service Card on which is entered the above key number and your name and address.

716
WALKER SUPERDRAW

Walker Process Equipment, Inc., Aurora, Ill., has published a series of four line drawings showing the operation of their new closed-system for supernatant liquor withdrawal called **"The Superdraw."** This series explains by text and drawings how the Superdraw actually acts as a small, efficient, sedimentation unit that functions in the center of the digester to pull liquor from the well digested sludge zone, clarify it, and discharge the clarified liquor thru the draw-off (or overflow) control piping. The drawings cover the Superdraw; Dual Digester Layout with Heatx and Superdraw; Floating cover and Superdraw and Gas Holder Cover and Superdraw. Included also are ordering specifications on the Superdraw.

To obtain copies of these very informative drawings, use a Reader Service Card on which is entered the above key number and your name and address.

717
DRESSER WATER LINES REPORT

Dresser Manufacturing Division, Bradford, Pa., has just released its third annual report of water lines entitled, **"A Report of Dresser-Coupled Steel Water Lines in the Year 1949."**

This 8-page, 3 color, illustrated report carries construction details on principal steel water lines laid during the past year. Waterworks engineers and contractors interested in latest developments in waterline construction methods and materials will find this report of extreme value.

To obtain a copy of this informative report, use a Reader Service Card on which has been entered the above key number and your name and address.

718
WATERSPHERE

Chicago Bridge & Iron Co., Chicago, Ill., has published a pamphlet on the **Watersphere,** the modern, streamline elevated water tank of welded construction. This pamphlet beautifully illustrated with full page photographs of actual installations of the Watersphere showing sizes from 25,000 to 150,000 gal. capacities. Ground and rooftop installations are shown. Details of design and construction along with a chart showing capacity in gallons and diameter of spheres and a cut-away diagram of the Watersphere are also discussed.

To obtain a copy of this pamphet, use a Reader Service Card on which is entered the above key number and your name and address.

719
SEWAGE & TRASH PUMP

Fairbanks, Morse & Co., Chicago, Ill., have just published a bulletin on their **Bladeless Sewage and Trash Pump.** This attractive two color bulletin shows actual photographs of the pump alone and also mounted on a sturdiweld steel base direct-connected to a Fairbanks-Morse motor. Another interesting feature is the cut-away drawing in which each part is numbered to correspond with the appropriate text explanation regarding the details of construction. Also shown by line drawings are the various drive modifications for the vertical shaft pumps and the principal

HYDRO-TITE
DEPENDABLE JOINTING COMPOUND
Seals Bell and Spigot Water Mains
Economical—Effective
Over 35 Years Of Dependable Performance
HYDRAULIC DEVELOPMENT CORP.
MAIN SALES OFFICE 50 CHURCH ST., N. Y. C.
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MOTOR TRUCK MOUNTING
FOR GATES TO 60 IN.
★ ★ ★ ★
PORTABLE FOUR WHEEL TYPE
GATES UP TO 48 IN.
★ ★ ★
DEAN GATE OPERATORS
FOR SMALL GATES IT'S THE POWERENCH
GAS ENGINE DRIVE
PORTABLE, WEIGHS 37 LBS.
PAYNE DEAN & CO. MADISON, CONN.

NEW BOOKLET on SEWAGE TREATMENT AND THE Bio-Chemical Process
PROVED • SIMPLE • ECONOMICAL
This interesting and useful booklet is available free upon request.
INFORMATIVE!
THE BIO-CHEMICAL PROCESS
2266 North Meridian Street, Indianapolis 8, Indiana
120 Broadway, New York 5, N.Y.

dimensions of both the vertical and horizontal shaft pumps complete with discharge positions. Selection tables for ease in selecting the proper pump and frame are shown in the back of the book along with complete typical specifications for the use of architects and engineers.

To obtain a copy of this new bulletin, use a Reader Service Card on which is entered the above key number and your name and address.

720

GRAVIMETRIC FLUORIDIZER

Omega Machine Co., Providence, R.I., has just made available a bulletin covering its **Gravimetric Fluoridizer.** This 2 color bulletin, amply illustrated with photographs of the Fluoridizer in actual installations, shows different methods of installing it in addition to a discussion of fluoride compounds. The bulletin also describes the features, accessories available and auxiliary equipment. A cross-section diagram on the back page describes the operating principle of the fluoridizer. A set of general specifications covering the fluoridizer are included.

To obtain a copy of this bulletin, use a Reader Service Card on which is entered the above key number and your name and address.

721

LUBRICATED PLUG VALVES

American Car and Foundry Co., Detroit, Mich., has just published a pamphlet covering **Lubricated Plug Valves** and explaining their particular application to raw sewage and industrial wastes. Included are complete specifications. The back page shows cross sections of the valves and listings of typical cities or projects that have installed these lubricated plug valves. Also listed is the number of valves and range of sizes used in these installations.

To obtain a copy of this pamphlet, use a Reader Service Card on which is entered the above key number and your name and address.

722

WATER TREATMENT

Liquid Conditioning Corp., Philadelphia, Pa., has available a combined bulletin-catalog called **Liquon Instructions.** The material is composed of reprints of articles and technical bulletins pertaining to practically all phases of water treatment. Attractively bound in a heavy-duty green cover this compilation contains information on: Filtration of Water through Diatomaceous Earth, Diatomite Filters, Water Conditioning

WARREN
Solves Your
PIPE
PROBLEMS
BELL & SPIGOT PIPE • FLANGE PIPE • MECHANICAL JOINT PIPE • FLEXIBLE JOINT PIPE • SPECIAL CASTINGS • SHORT BODY BELL & SPIGOT SPECIALS •
Warren Cast Iron Pipe and Fittings can be supplied in all sizes 2" to 84" with all types of joints and in accordance with Standard Specifications. Specify "Warren Pipe" for your next job.
Take advantage of our large stock of non-standard patterns, when in need of special castings to meet your individual requirements.
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FOUNDRY & PIPE CORP.
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WARREN PIPE CO. of MASS. INC.
75 FEDERAL ST., Boston, Mass.

Since 1886

"Ebony Paint Kills Rust"

A Refined Coal Tar Base Paint

No matter how old the job—5 to 25 years—rust has never been found under EBONY PAINT.

Specified by many Engineers for Sewage Disposal and Water Plants.

Quart sample and literature on request.

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LABORATORY MIXER

IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.

PHIPPS & BIRD, INC. **Richmond, Va.**

TEST WATER HARDNESS

this SIMPLE, FAST, ACCURATE way

• • •

TAYLOR TOTAL HARDNESS SET

This new Taylor Set replaces the slow, inconvenient soap test . . . make fast, accurate determinations on waters ranging in hardness from 1 to 1400 p.p.m. . . . ideal for checking boiler water or as a control test on zeolite or lime-soda treated waters.

HERE'S HOW SIMPLE A WATER HARDNESS TEST CAN BE . . .

You simply place a 50 cc. sample of the water to be tested in a 250 cc. flask with 2 drops of Taylor Hardness Indicator and 1 cc. of Taylor Hardness Buffer. At this point the sample will be red. Add Taylor Hardness Reagent from a burette until the red color changes sharply to blue. Multiply the burette reading in cc. by 20 and . . .

There's the Value!

WRITE FOR COMPLETE INFORMATION

Each Taylor Total Hardness Tester is sold complete . . . includes all necessary equipment and reagents. Write direct for prices and additional information. Also ask for the Taylor Handbook "Modern pH and Chlorine Control".

W. A. TAYLOR AND CO.
7308 YORK RD. • BALTIMORE 4, MD.

CONTROL
Gas Pressures

From Digestion Tanks with NORWALK REGULATORS and CHECK VALVES

Handling sewage gas from digestion tanks is one of Norwalk Valve's activities in the manufacture of gas pressure control equipment. Stock items include check valves, pressure relief valves, regulators, all sizes and pressures. Illustrated are the Norwalk Disc Check Valve and the "Meter Cop" (a Norwalk exclusive).

DESIGN AND FABRICATION OF SPECIAL UNITS

Any unusual problems can be solved by our design and fabrication of special units. Norwalk products are made with ASTM and other materials required by contract specifications.

Outline your requirements in a note to us. We'll be glad to suggest designs and special equipment. We'll also send along a catalogue of our complete line of gas control equipment.

NORWALK VALVE COMPANY
33 RAILROAD AVENUE
SOUTH NORWALK, CONN.

Equipment for Swimming Pools, Iron and Manganese Removal, Water Treating Equipment for the Beverage Industry, Silica Removal by an Improved Ion-Exchange Process, Reclaimer Tratment of White and Waste Waters, Sludge Contact Reactors in White and Waste Water, Modern Practices in Municipal Water Softening, Clarifying filters, Chemical Feeders, Sludge-Contact Reactors, Equipment and Materials for Conditioning Water and Other Liquids, Deaerating Heaters, Vacuum Deaerators, Trends in Modern Feedwater Conditioning Equipment, etc.

To obtain a copy of this comprehensive booklet on water treatment, use a Reader Service Card on which is entered the above key number and your name and address.

723
SWITCHES

Mercoid Corp., Chicago, Ill., has published a 65 page catalog entitled **Mercoid Switches.**

This catalog covers a complete listing of switches manufactured by Mercoid for heating, air conditioning, refrigeration and various types of industrial applications. Over a hundred headings are listed in the index covering every type of controls, valves, switches, clocks, time switches, limit controls, pressure controls, liquid level controls, many of which are applications in water and sewage works. Specifications, photographic and schematic illustrations are shown on the controls listed. Conversion tables, ordering data and control dimension data are also included.

To obtain a copy of this valuable reference catalog, use a Reader Service Card on which is entered the above key number and your name and address.

724
DRY FEEDERS & CONTROL TABLES

F. B. Leopold Co., Inc., Pittsburgh, Pa., has just issued two new bulletins on its **Chemical Feeders** and **Operating Tables.** The bulletin covering the L-P Dry Chemical Feed Machine has complete specification information covering cabinet, hopper, feed mechanism, drive mechanism, control adjustments, agitators, dissolving chamber and electric motor. Charts are also provided giving the capacities in pounds per hour of the three standard size machines covering hydrated lime, soda ash, alum and activated carbon. Included

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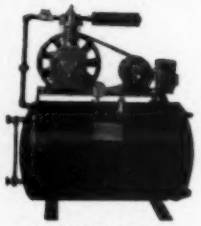

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are line drawings of the rear and side of the feeder showing location of component parts.

The bulletin on **Hydraulic Control Tables** contains specifications regarding size, supporting frame, table construction, manifold header, four-way valve units, valve operating levers, valve indicating device and illumination. Also included are line drawings showing cut-away view of the disc type 4-way valve and assembly of standard parts for operating table, disc valve type.

To obtain copies of these bulletins, use a Reader Service Card on which is entered the above key number and your name and address.

725
SLUDGE COLLECTOR

Link-Belt Co., Philadelphia, Pa., has a bulletin on **Link-Belt Circuline Sludge Collector for Settling Tanks.**

This bulletin shows the installation of these Circuline Collectors, discusses scum removal from primary tanks, sludge collection and removal in both primary and final settling tanks. Complete tables are included covering capacity required in cubic feet in circular tanks, influent table for primary tanks, table of dimensions, weirs, baffles, etc., table for final tanks after sprinkling filter, and final tanks—activated sludge.

There is a section on specifications for both the type "A" and type "B" circuline collectors and other Link-Belt sewage and water treatment plant equipment.

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726
CHLORINE TREATMENT

Fischer & Porter Co., Hatboro, Pa., have just released a bulletin entitled **"Chlorine Treatment of Municipal Water"** which summarizes present day processes and equipment and thus provides a yardstick for checking either present facilities or possible future requirements of the waterworks engineer.

Flow diagrams and illustrations contained in this bulletin describe the use and advantages of process instrumentation in municipal water treatment and principal points of application of chlorine.

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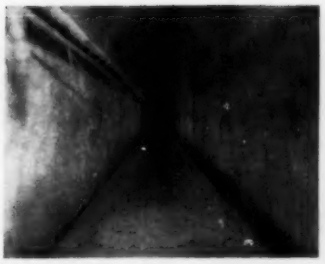

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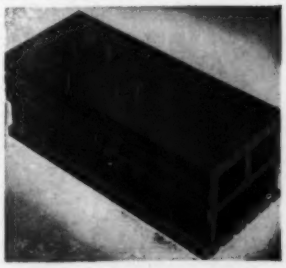

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Washington, Blue Plains Plt.	2	1944-45	136.3	12	186' Dia.	14	1.88	1350	183	83	49	6.85	67.5	173	120	30.5
Gary, Ind.	4	1941-44	20.11	4	75' Sq.	10	2.0	900	265	184	81	5.32	63	148	72	47.2
Winnipeg, Man.	2	1943-44	22.8	2	115' Dia.	12	1.98	1100	348	159	55	9.0	70.5	310	231	25.5
Battle Creek, Mich.	5	1938-42	4.92	2	80' Dia.	10	3.88	480	282	85	70	5.5	82.5	264	174	34.1
Buffalo, N. Y.	3	1939-41	135	4	160' "	15	1.6	1000	208	114	46	5.77	59	138	107	22.5
Albuquerque, N. M.	7	1938-46	5	1	80' "	12.2	2.21	885	254	91	61	3.96	61	282	158	44.5
Yakima, Wash.	1	1942	9.5	4	90' "	9	4.32	373	110	23	74	6.88	74.4	175	92	58
Appleton, Wis.	7	1938-45	4.8	2	70' "	10	2.98	823	276	63	77	5.6	58	284	141	50
Baltimore, Md.	4	1939-44	80.5	3	170' "	12	1.64	1360	214	63	61	3.9	82.7	281	204	27.5
Springfield, Ohio	4	1937-40	14.8	2	90' "	10	1.55	1160	166	93	62	—	—	98	43	52
Mansfield, Ohio	2	1944-45	3	1	65' "	12	2.38	985	208	87	58	4.2	76	227	139	38.8
Cedar Rapids, Ia.	9	1936-44	4.21	1	70' "	11.5	1.95	1060	354	132	63	5.5	81.2	383	291	24
Austin, Texas	2	1944-45	5.84	1	75' "	12	1.89	1275	263	95	64	4.0	83	285	152	46.3
Neenah-Menasha, Wis.	4	1942-45	7.93	2	75' "	10	1.8	1750	681	188	72	—	—	—	—	—
Denver, Colo.	5	1939-43	46	4	140' "	9.7	2.34	750	187	44	77	5.4	76	212	108	49
Sheboygan, Wis.	1	1944	8.4	2	80' "	10	2.8	635	342	60	82	7.2	81.1	513	285	44
Ypsilanti, Mich.	3	1943-45	1.66	2	40' "	9	2.5	860	226	67	62	8.2	71.4	141	95	33
Monroe, Mich.	8	1938-46	4.3	2	85' "	7.5	3.55	378	329	75	77	5.23	67.7	135	73	46

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Performance is one of the primary factors upon which Clarifier excellence should be judged. Are you getting the best?

Close-up of peripheral overflow from one of four 160' dia. Dorr Sifeed Clarifiers at Buffalo, N. Y.

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After one year of this treatment we have accomplished:

1. A great reduction in taste and odor complaints.
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3. Reduction in the number of filters washed:
   10,287 washed in 1948—5,917 washed in 1949
4. Period of service of filters greatly increased.
5. A larger chloramine residual leaving the plant than we formerly were wont to carry.

At the present time we have not realized any savings in the cost of chemicals. This is primarily due to the type of water we must treat. Since the raw water has a low alkalinity the additional use of chlorine must of necessity call for soda ash treatment and therefore additional cost.

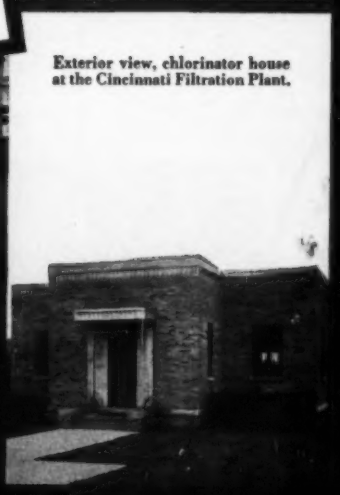
Regardless of the cost we feel that the efforts expended to install and maintain the Break-Point process of chlorination has been unquestionably justified.

Yours very truly,

CINCINNATI WATER WORKS

E. B. Evans
Sup'vr. of Water Purification

From: E. B. Evans



Exterior view, chlorinator house at the Cincinnati Filtration Plant.

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